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NEW SERIES

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BULLETIN
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SOME NEW BEETLES IN THE FAMILIES CANTHARIDÆ (LAMPYRIDÆ), PTINIDÆ, AND SCARABÆIDÆ, FROM WESTERN NORTH AMERICA, WITH NOTES UPON OTHERS.

By Edwin C. VanDyke.

Cantharidæ (Lampyridæ).

Plateros californicus n. sp.—Moderately robust, black, prothorax with sides fulvous. Antennæ extending backwards beyond middle of body, distinctly serrate, second joint small and transverse, third triangular, but little longer than broad and about two thirds length of fourth, fourth slightly broader than third and one third longer than broad, fifth as broad as third, longer than fourth but distinctly less than twice as long as wide, sixth as long as fifth, slightly narrower and about twice as long as broad, the outer joints gradually narrower, joints 3–9 with outer angle acute and distal side of joint oblique. Prothorax broader than long, not carinate at apex but with apical margin notched, basal cellule rather broad and deep, with its basal and lateral margins elevated and gradually spreading out and merging with the disc in front. Elytra with alternate interstitial lines but slightly more elevated and then only near base, otherwise as in *canaliculatus,* which it superficially resembles. Length 8 mm., breadth 3 mm.

Type, a unique male in my own collection, collected by myself at Carrville, Trinity Co., Cal., July 5, 1913.

This species closely resembles *P. canaliculatus* Say but differs principally in having more robust and more distinctly serrate antennæ, and in having a very broad basal cellule on the prothorax as against a somewhat linear one in that as in most other species of the genus. This is the first species of the genus to be found on the Pacific coast.

Calochromus slevini n. sp.—Black, pronotum and elytra to slightly beyond middle crimson, apical portion of the elytra blue black, velvety with extremely fine short pubescence. Head with vertex finely, sparsely punctured and pubescent, a well-defined triangular impression between the eyes, the eyes convex and of moderate size, muzzle short, no beak, antennæ over one half length of body, second joint about one half as long as the third which is shorter than the fourth, outer joints moderately compressed, about twice as long as wide, distal side slightly oblique. Pronotum quadrate, three fourths as long as wide, front angles rounded, posterior angles acute though rounded at extreme apex and divergent, sides thickened and reflexed, not impressed at middle, with a strong ridge running from the middle of the sides obliquely and slightly forwards on to the disc which is only feebly channeled near the base, apical margin thick and strongly reflexed, the basal thinner and less reflexed. The scutellum black and truncate behind. The elytra elongate, with sides parallel and narrowly margined, but little wider than the prothorax, closely but indistinctly striate and with punctures not evidently defined, the alternate intervals perceptibly more prominent, especially posteriorly, but not costiform, not reticulated. Middle and hind tibia slightly curved. Length 9 mm., breadth 3 mm.

♂ smaller, antennæ reaching to beyond middle of body, seventh ventral segment broadly and deeply semicircularly emarginate.

♀ larger, 12 mm. in length by 4 mm. in breadth, antennæ not reaching middle of body, posterior angles of pronotum right and less prominent, seventh ventral segment with small apical incisure closed at apex by membrane and with triangular impression extending forwards.

Type male and female in my own collection, collected September 19, 1916, at Gilroy Hot Springs, by Mr. L. S. Slevin. These, together with a third specimen, were kindly presented by the captor, after whom I take pleasure in naming it.

This species, according to its physical characters, would follow *C. fervens* Lec., as indicated by the latest table,* but according to its coloration would come closest to *C. dimidiatus* Lec. From the latter, which is confined to the Sierras and northern California, it differs by having the pronotum and base of elytra of a scarlet rather than an orange color, by having the apical blue-black color not extending forwards as far as the middle of the elytra and by meeting the crimson squarely, whereas in the other it extends fully to the middle and to a greater extent at the suture than at the margins, by not having the side margin of pronotum impressed at the middle, and by having the posterior tibia slightly curved.

Ginglymocladus (Gr. hinge + branches) n. gen.—Elongate, somewhat parallel, in shape simulating *Calochromus,* above somewhat closely punc-

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* "Synopsis of the Lampyridæ of the United States," by John L. Leconte, Trans. Am. Ent. Soc., Vol. IX (1881), p. 28.

tured and slightly rugulose, elytra narrowly margined. Head concealed under the prothorax, short and broad; eyes distant, convex, moderate in size, finely granulated; antennæ inserted just in front of the eyes, moderately widely separated at base, eleven jointed, strongly pectinated, the processes fusiform and with a distinct joint at point of attachment so that they can be either adducted or abducted, first joint somewhat triangular, hardly longer than wide, second shorter and narrower, transverse, third triangular, longer and broader than second, outer margin oblique, joints 4–10 triangular, longer than broad and each with a fusiform internal appendage almost as long, as long, or slightly longer than the joint and arising about the middle or beyond, the eleventh elongated and somewhat rounded at apex, not acute sinuate; front concave behind the antennæ, convex in front; labrum transverse, with front margin emarginate, distinctly separated from the front; mandibles acute and toothed; palpi moderate in length, maxillary longer, last joint somewhat fusiform and pointed at tip. Prothorax transverse, lateral and apical margins of moderate width, reflexed, and thickened at edge, posterior margin less distinctly defined. Scutellum small, somewhat quadrilateral. Elytra with rounded humeri, elongate, subparallel, broadest one third distance from apex, disc rather flat, without striæ or distinctly elevated lines but more or less uniformly granulose, side margin narrow and but slightly reflexed, epipleuræ hardly evident. Front coxæ conical, contiguous, middle coxæ quadrate, contiguous, hind coxæ narrow, transverse, contiguous. Legs slender, trochanters on the inner side of thighs, tarsi with joints 1–4 gradually shorter, third and fourth slightly lobed beneath, fifth slender, claws somewhat dilated at base. Abdomen with seven ventral segments.

This peculiar genus, which I have founded upon *G. discoidea* and to which I have also added a second new and closely related species, occupies a somewhat anomalous place in the family. It appears to be more closely related to *Matheteus* than to any other genus in our fauna and like it has the contiguous middle coxæ, characteristic of the subfamily to which that belongs, as well as the pectinate antennæ, though they are of a different type. It, however, has the facies and hardly discernible epipleuræ of certain of the elongate members of the preceding subfamily Lycidæ.

Ginglymocladus discoidea n. sp.—Elongate, subparallel, flattened, black except entire border of prothorax, basal, lateral, and sutural margin of elytra, V-shaped impression on front, clypeus, labrum, underside of head, prothorax and mesosternum, parts of coxæ and trochanters, which are rose-colored, and the tips of last joint of antennæ and palpi, the last two tarsal joints, the last abdominal segment and posterior margin of preceding, which are ferruginous. Head with broad V-shaped depression on front, a slight convexity between eyes; antennæ extending backwards to about middle of body, first joint moderate in size, second small and transverse, third somewhat larger and triangular, joints 4–10 triangular in shape, somewhat longer than broad and gradually decreasing in length outwards, with a fusiform process slightly shorter than joint attached to the outer side of the frontal angular part of each, eleventh joint elongate, longer than fourth, slightly constricted beyond its middle, and rounded at apex; mandibles moderately prominent, acute, and with tooth near base. Thorax about twice as broad as long, basal margin barely rounded, lateral margins straight and but slightly diverging from base, the apical margin broadly rounded, both basal and apical margins indistinctly notched at middle, all margins thickened and distinctly reflexed, disc somewhat flattened, finely and somewhat sparsely punctured, a fine hair arising from each puncture. Elytra at base slightly broader than thorax, with sides straight though gradually diverging to posterior two thirds, thence rounded to individually rounded hind angles, humeri moderately prominent, disc flattened, rather finely and somewhat closely punctured, each puncture with a hair arising from the same, and slightly transversely rugulose. Beneath rather finely and moderately closely punctured. Femora and tibia slightly flattened, the tarsal claws each with broad tooth at base. Length 6 mm., breadth 2.25 mm.

Type and paratype, both males, in my own collection. They were taken in Lagunitas Canon, Marin Co., Cal., crawling over the herbage, the type by myself April 23, 1916, the other by Mr. A. Muzzall, April 11, 1915.

Ginglymocladus luteicollis n. sp.—Elongate, subparallel, flattened, piceous except the thorax outside of a piceous discal spot and median portions of last three abdominal segments which are luteous and head, legs, and palpi which are piceo-luteous. Head with front convex and shining, a slight transverse depression between eyes; antennæ extending backwards to about middle of body, joints as in preceding species except that from 4–10 they are almost twice as long as broad and the angular portions to which the processes are attached are only about one third from the distal end instead of near the middle; mandibles acute. Thorax slightly less than twice as wide as long, basal margin slightly convex backwards, sides arcuate and apex broadly rounded, all margins thickened and slightly reflexed, disc somewhat flattened and very finely sparsely punctured, the surrounding fossa more coarsely and densely punctured, a fine hair arising from each puncture. Elytra at base slightly broader than thorax, gradually broader to posterior two thirds, then broadly rounded to apex, the hind angles individually rounded but not markedly so, humeri moderately prominent, disc flattened, finely, somewhat sparsely punctured, each puncture with minute hair, finely scabrous and with three vague elevated lines. Beneath rather finely and sparsely punctured. The legs are slender and not particularly compressed and the tarsal claws are broad at base without distinctly defined tooth. Length 5.25 mm., breadth 2 mm.

Type, a unique male in my collection, collected many years ago and probably in the middle Sierras of California.

This species differs from the preceding primarily as regards the color, the frontal characters, the antennal joints, the shape of the thorax, and the legs.

Matheteus theveneti Lec.—This very rare and beautiful species, first collected at Mariposa, Cal., has in recent years been taken in Humboldt Co., Cal., by Professor E. O. Essig and others.

Phausis (Lamprohiza).—In comparing my series of *P. splendidula* Linn. with *P. reticulata* Say., both collected in the mountains of North Carolina, I find that they can be best separated by size, the former averaging 8 mm. in length as against 6 mm. for the latter. The thoracic characters as given by LeConte in his synopsis are not reliable, for the thorax in *reticulata* is more often "wider than long" than it is "not wider than long."

In my series of *P. riversi* Lec., assembled from various places in northern California and the Sierras, I find that there is a great amount of variation as regards the color of the prothorax. In most, this is typical, yellow with a piceous discal spot, but there are others with it entirely yellow and even the scutellum yellow, while one, from Inverness, Marin Co., is entirely black with the exception of the extreme margin, which is yellow. A few specimens also have the sixth ventral segment luminiferous, not merely yellow. The generic name *Phausis* of LeConte should supplant *Lamprohiza* of Motschulsky, according to the more recent European authorities.

Mastinocerus californicus n. sp.—Slender, flattened, subopaque, piceous, the legs, mouthparts, and last two abdominal segments luteo-piceous. Head indistinctly scabro-punctate, broader than long, antennæ longer than head is broad, first joint as long as second and third together, which are simple, joints 4–10 slightly increasing in length, each with two long cylindrical apical processes, about three times as long as the joints themselves, eleventh slightly longer than tenth and provided with a single process which arises from its apex. Prothorax a little wider than long, as wide as head and slightly narrower than elytra, median half of base broadly lobed, posterior angles rectangular and blunt, sides straight and parallel for posterior two thirds, then rounded to apex, apex slightly arcuate, disc flat. Elytra less than one half as long as the abdomen. Length 7 mm., breadth 1.25 mm.

Type, a unique in my collection, collected at Sobre Vista, Sonoma Co., Cal., May 30, 1910, by Mr. J. Aug. Kusche, and kindly presented by him. A second, from Kaweah, Cal., is in the collection of Mr. Ralph Hopping.

This very interesting species differs from both *M. texanus* Lec. and *M. opacus* Horn in the fact that the head and prothorax are both more transverse, that the base of the thorax is more distinctly lobed, and that the antennæ are distinctly longer than the head. In *texanus,* the disc of the thorax is slightly convex, but in this species it is flat as in *opacus.* In *californicus* the two processes which arise from each intermediate antennal joint arise close to the apex, not basally as stated by LeConte for *texanus,* and the eleventh joint most distinctly has a single terminal process of its own. *Californicus* is also mainly piceous in contrast to the usual testaceous color of the other two. The color is, however, inclined to vary in all, I believe.

PTINIDÆ.

Eucrada robusta n. sp.—Elongate, parallel, piceous, tarsi paler. Head rather finely and sparsely granulate and sparsely clothed with fulvous pile, the antennæ reaching to beyond the middle of the body, second joint small, third two thirds length of fourth and distinctly serrate, joints 4–10 of about equal length and markedly serrate, the projecting processes almost equaling the shank, the eleventh joint longer than tenth and slightly clavate. Prothorax broader than long, very convex, the disc compressed basally, a shallow groove just back of apical margin, surface granulate, less markedly at sides. Elytra three times the length of prothorax, over one third wider, evenly convex, closely and coarsely striate-punctate, the punctures irregular on disk but quite regular and larger at sides, intervals narrow, each with a row of minute depressed fulvous hair, narrowly margined at sides but more broadly so at apex. Beneath finely, rather sparsely punctate, except last ventral and pleura, which are granulose. Length 8 mm., breath 3.25 mm.

Type, a unique female in my collection, taken in the Selkirk Mountains of British Columbia, during the summer of 1905, by Professor J. C. Bradley and kindly presented by him.

This species is most distinct, its larger size, uniform color, and regular convex elytra enabling it to be readily separated from *E. humeralis* Melsh., the only other species in the genus.

Ernobius cupressi n. sp.—Elongate, moderately robust, brown with luteous areas along suture near apex, slightly shining, moderately well clothed with short, fine recumbent hair. Head granulate-punctate, eyes separated on the front by about twice their vertical diameter, slightly smaller in female and more broadly separated; antennæ of male extending to last quarter of elytra, all joints longer than wide, joints three and four nearly equal and about twice as long as wide, 5–7 but slightly increasing in length outwards and at least three times as long as wide, eighth fully four times as long as wide, ninth as long as seventh and eighth together, 9–11 of about equal length and five or six times as long as wide; the antennæ of female extending to about middle of elytra; joints three and four nearly equal, narrow and about twice as broad as long, joints five and six slightly longer and more robust and each of about similar length, joints seven and eight slightly longer, ninth about two thirds as long as two preceding together, 9–11 of about equal length and from three to four times as long as wide. Prothorax three fifths as long as broad, as wide as elytra, sides strongly arcuate and broadly margined, front and hind angles rounded, anterior margin transverse, base broadly lobed at middle, surface quite closely granulate-punctate. Elytra parallel, over three times as long as thorax and twice as long as broad, surface slightly more finely and sparsely punctate than thorax, and with costæ vaguely indicated. Beneath finely closely punctate on abdomen, more coarsely in front. Basal tarsal joint slightly shorter than the two following together. Length 6 mm., breadth 2.5 mm.

Type male and female in my collection, collected at Carmel, Monterey Co., Cal., by Mr. L. S. Slevin. They were beaten from Monterey cypress, *Cupressus macrocarpa* Gord. Thirteen other specimens in my collection as well as numerous ones in Mr. Slevin's collection have also been examined.

This splendid species is most closely related to *E. socialis* Fall, a species found in the same territory but generally on the Monterey pine, and should perhaps precede it in the table.* It differs in being much larger and more robust, so far the largest species to be listed in our fauna, less shining, with denser and longer pile, with the intermediate joints of the antennæ in the male proportionally longer, so that there is not the great contrast in length between the three terminal joints and those which precede that there is in the other species, and with the anterior margin of the prothorax transverse and not arcuate.

Vrilletta decorata n. sp.—Moderately robust, piceous black, the elytra variegated with yellow, the usual markings consisting of an irregular oblique patch just posterior to the base and involving the intervals from 2–5, and a series of stripes along the apical portions of the third and seventh intervals and the basal part of the ninth, with very fine, short, fulvous pubescence. The head granulate-punctate, with a faint longitudinal ridge; the antennæ extending beyond hind angles of prothorax, joints 3–8 serrate and slightly more than one half width of ninth, the ninth and tenth much enlarged and serrate, the ninth slightly longer than broad and the tenth fully one fourth longer and both obliquely truncate at distal end, the eleventh joint fusiform and a little longer than tenth. Prothorax three fifths as long as broad, sides widely margined, the base with median third moderately lobed, the apex moderately arcuate, the disc very convex, only slightly depressed at sides back of anterior margin, surface moderately closely and finely granulate-punctate. The elytra distinctly less than three times as long as prothorax, the striations very finely punctate, the intervals convex, apices truncate and moderately margined. Length 5.5 mm., breadth 2.5 mm.

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* "Revision of the Ptinidæ of Boreal America," by H. C. Fall, Trans. Am. Ent. Soc., Vol. XXXI (1905), p. 140.

Male narrower and smaller than female and with eighth and ninth antennal joints a little longer proportionally.

Type male and female in my collection, taken in Oakland Hills, Cal., May 14, 1911, and April 26, 1908, both from the coast live oak, *Quercus agrifolia* Née.

This is the commonest species of the genus and has been generally classed as *V. expansa* Lec., but it is quite distinct. Fall, in his "Revision of the Ptinidæ,"* intimated that it was probably so, but he lacked material enough to warrant him in separating it then. With ampler series which recent years' collecting has provided, I find that the separation can be readily made. The typical *V. expansa* Lec. differs from this species by being generally longer and of a uniform pruinose color, by having the prothorax proportionally longer, five sixths of breadth, the sides more decidedly margined and explanate, especially posteriorly, the base with median area formed into a more prominent lobe, the disc quite decidedly compressed in front of the middle, so that when the thorax is viewed directly from above, the lateral contour is much sinuated, as contrasted with the slightly arcuate one of the other, the surface more closely punctured, and the elytra with the striæ more distinctly punctured and the apices more broadly truncate. The color pattern in *decorata* is variable, but I have never seen an absolutely immaculate specimen. The species ranges from Washington to Southern California, but appears to be found only near the coast. It breeds in the dead twigs and branches of various species of oak, the California laurel, and so forth. The true *V. expansa* Lec. seems to be more of a northern and mountainous species. My specimens are from Corvallis, Ore., Northern Trinity Co., Lake Tahoe, and Tuolumne Co., Cal.

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* L. c., p. 195.

SCARABÆIDÆ.

Aphodius sigmoideus n. sp.—Oblong, moderately convex, with sides almost parallel at middle, black with small spot at anterior angles of thorax pale, legs rufotestaceous, elytra piceous with testaceous design, and antennæ rufo-testaceous with piceous club. Head moderately coarsely, regularly, and rather sparsely punctured; front distinctly trituberculate, the median tubercle somewhat acute and the most prominent, no transverse ridge uniting them; clypeus hemihexagonal, apex widely and quite deeply emarginate, and with the angles rounded, flattened just back of emargination, sides broadly margined and with margins much reflexed, genæ distinctly acutely angulated. Prothorax narrowed in front, sides feebly arcuate, hind angles obtusely rounded, disc sparsely, finely punctured with larger scattered punctures, somewhat denser at the sides, basal margin well defined. Scutellum small, slightly concave and coarsely punctured anteriorly. Elytra just perceptibly narrower than the thorax, rather deeply striate, striæ finely, shallowly, and sparsely punctured, intervals broad and flat, very minutely and sparsely punctured, the design consisting of a fairly well-defined testaceous sigmoid marking starting on the second interval one quarter distant from base, curving outwards to the seventh interval, thence inwards to the third, and finally outwards to the eighth interval, the basal portion connected to the base of the elytra by a light patch on the second, third, and fourth intervals, and another running up the sixth to the humerus, the posterior portion of the first interval and also the apical margin somewhat light. Body beneath with moderately coarse punctuation on sides of abdomen and mesothorax, elsewhere smooth or with very fine, sparse punctuation; mesosternum not carinate. Anterior tibia distinctly tridentate, feebly crenulate above, and with the first joint of tarsus distinctly shorter than the second. Posterior femora with few fine punctures on outer face and series of coarser near posterior margin; the hind tibia fimbriate with short equal spinules; the first joint of hind tarsus slightly longer than the following two together. Length 9.25 mm., breadth 4.5 mm.

Type, a unique in my collection, captured by myself in Paradise Park, Mt. Rainier, Wash., altitude 6,000 feet, in late July, 1905.

This very large and distinct species is the largest in western North America, being somewhat larger than *A. rubidus* Lec., and only exceeded in size among American species by *A. fossor* L. and *A. rufipes* L. It belongs in Dr. Horn's table,* in his "Group B" in the subgenus *Aphodius* and should come just before *A. congregatus* Mann, a species which somewhat suggests it but is much smaller and with less of an elytral design.

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* "A Monograph of the Aphodini Inhabiting the United States," by George H. Horn, M.D., Trans. Am. Ent. Soc., Vol. XIV (1887), pp. 1–110.

Psammodius grundeli n. sp.—Oblong, slightly broader behind, convex, moderately shining, piceous, legs rufous, antennæ rufo-testaceous. Head moderately convex, coarsely and moderately closely verrucose, a distinctly defined linear transverse impression separating verrucose area from occiput, the occiput smooth except for a few minute punctures near anterior margin; clypeus broadly and shallowly emarginate, angles each side obtuse and rounded, sides slightly arcuate, genæ obtuse. Thorax one third wider than long, slightly narrower in front, anterior angles very obtuse and rounded, hind angles broadly rounded, base arcuate, the marginal line distinct, disc convex, with median depression extending from base to middle, with coarse and somewhat widely separated punctures and a few very minute punctures on intervening areas, with deep lateral transverse impression just back of anterior margin and another less defined half way to base, this latter extending vaguely on to the disc. Elytra as wide at base as the prothorax, humeri obtuse, sides nearly straight, slightly divergent, striæ deep, moderately closely crenately punctured, intervals convex, smooth. Beneath slightly scabrous at sides of mesothorax and with abdomen quite smooth. Posterior femora stout, smooth, the marginal line moderately deep, almost reaching trochanter; the tibia moderately stout, without oblique ridges, the spurs unequal, slender; the tarsi longer than one half the tibia, the first joint somewhat broader at apex. Length 3.25 mm., breadth 1.25 mm.

Type in my own collection. Paratypes deposited in the U. S. National Museum and California Academy of Sciences.

Twelve specimens in my collection served as a basis for this description. They were all collected at Martinez, Cal., in June, 1910, by Mr. J. G. Grundel, after whom I take pleasure in naming it. Other specimens in the collection of Dr. F. E. Blaisdell, also from the neighborhood of Martinez, have been seen.

This species is perhaps most closely related to *P. nanus* DeGeer. It is, however, not only larger, but more elongate, with the longitudinal and transverse impressions better defined, and the punctuation of the elytra coarser.

Psammodius desertus n. sp.—Oblong oval, broader behind, convex, shining, rufo-piceous, disc of thorax and occipital ridge piceous, elytra and femora testaceous. Head coarsely, irregularly punctured in front, finely and sparsely on occiput, with distinct yet slightly elevated transverse ridge in front of occiput, and vague short secondary transverse elevation between this and clypeal margin; clypeus broadly emarginate, a small, obtuse reflexed tooth on each side, the sides slightly arcuate, a slight sinuation at end of frontal suture; genæ feebly prominent, obtuse. Thorax one third wider than long, base broadly rounded, sides slightly arcuate and convergent forwards, fimbriated, no posterior angles, anterior angles obtuse, basal marginal line distinct, disc convex, moderately coarsely and evenly punctured, punctures separated by at least their own diameter, longitudinal and transverse depressions absent. Elytra wider at base than thorax and slightly narrower than widest part of thorax, humeral angles rounded, sides almost straight and slightly divergent to posterior three fourths where elytra is broadest, thence broadly rounded to apex, striæ well defined but not deep, distinctly though shallowly punctured, intervals but slightly convex, with even ones broader than odd, a row of fine punctures down middle of each. Beneath sparsely punctured. Posterior femora stout, oval, the marginal line absent; the middle and posterior tibia moderately stout with two oblique ridges externally, the spurs of middle tibia long, about equal to first two tibial joints, and unequal, those of posterior stouter and subequal; the tarsi about two thirds the length of tibia, the first joint longer than two following and slightly broader at apex, the tarsal claws about two thirds length of last tarsal joint. Length 4 mm., breadth 2 mm.

Type and paratype in my own collection, collected by my friend, Mr. J. C. Bridwell, in the Imperial Valley, Cal., in February, 1911.

This species, according to Dr. Horn's table,* would come immediately after *P. caelatus* Lec., and before *P. hydropicus* Horn, being of the robust type and having the oblique ridges on the posterior tibia as in the former species and the thorax without transverse grooves as in the latter. It is even closer to the recently described *P. ambiguus*† Fall, as regards its general color, thoracic and tarsal characters, but is amply distinct, as was proven by Mr. Fall, who very kindly compared it with his type. Its main difference from this last is in regard to the type of sculpturing on the head.

Dichelonycha oregona n. sp.—Size and form of *fulgida* and *crotchii;* black except elytra, antennæ, forelegs, middle and hind thighs which are testaceous; upper surface sparsely clothed with short, fine, brown hair, the lower with a rather dense covering of coarse white pile. Head including eyes distinctly more than half as wide as thorax, densely, coarsely, and more or less regularly punctate, clypeal suture impressed, strongly angulate; clypeus moderately reflexed, truncate in front, with lateral angles broadly rounded and sides a little convergent anteriorly; antennæ nine-jointed, with club subequal in length to funicle, terminal joint of maxillary palpi widened apically and broadly obliquely truncate. Thorax without median groove, surface moderately coarsely and closely punctate laterally, more finely and sparsely on disc, basal and apical marginal lines distinctly impressed, sides obtusely and somewhat sharply angulated just before the middle, more or less straight in front of angulation, distinctly sinuate posteriorly, hind angles obtuse, sharp, and well defined. Elytra rather coarsely and densely punctured. Spurs of hind tibia slender, nearly equal. Beneath rather finely and moderately closely punctured. Length 9 mm., breadth 3.5 mm.

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* L. c., p. 93.

† "Coleoptera of New Mexico," Fall and Cockerell, Trans. Am. Ent. Soc., Vol. XXXIII (1907), p. 241.

The female differs from the male described above in being more robust, both as regards prothorax and body, having a breadth of 4 mm., in being testaceous except for the sides of pronotal disc and metapleura which are piceous, in having the antennal club much smaller, barely equalling the joints from 2–9.

Type male and female in my own collection, paratypes deposited in the U. S. National Museum and California Academy of Sciences.

This description is based upon twelve specimens collected by Mr. F. W. Nunenmacher at Waldo, Josephine Co., Ore., June 11, 1910. A much larger series which I have also seen is in Mr. Nunenmacher's own collection. The species is fairly constant as regards characters and coloration and is most nearly related to *D. fulgida* Lec. It differs from that, however, not only in color, but in lacking the metallic luster, in having but a sparse pronotal vestiture, in female as well as male, whereas in *fulgida* the vestiture is quite dense, in having the thorax more transverse, in possessing a less uniform type of pronotal punctuation, and by having the lateral angles of the prothorax much more sharply formed. Some few of the paler females of *fulgida* superficially approach the above, but these are more rufous than castaneous, as well as distinguished by the characters as given above. *D. pallens* Lec. is much smaller and proportionally more robust, besides having other distinguishing characters such as a different type of clypeus and prothorax. *D. testaceipennis* Fall has the same color pattern but is generally more robust and more shining, has the prothorax far less angulated at the sides, a less dense pubescence beneath, and so forth.

Dichelonycha clypeata Horn.—Several females of this rare species which have come into my possession since Mr. Fall's Revision,* collected at San Mateo, Cal., March 31, 1912, by Mr. Hermann Kusche, and at Grizzly Peak, Alameda Co., Cal., February 15, 1913, by Mr. J. C. Birdwell, show that the females are not only generally larger and more robust than the males, a length of 11 mm. and a breadth of 4.5 mm., as against a length of 9.5 mm. and a breadth of 3.5 mm. for the males, but that they have proportionally a more robust prothorax, with the sides more rounded, and more generally piceo-testaceous in color as contrasted with the usual uniform black of the males. In this last regard they agree with the only two other females known, the type female in the Horn collection and the female in the LeConte collection.

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* "Notes on Dichelonychia and Cantharis, with Descriptions of New Species in Other Genera," by H. C. Fall, Trans. Am. Ent. Soc., XXVII (August, 1901), p. 277–310.

Dichelonycha decolorata Fall.—This species has been found to be one of the characteristic insects of that most interesting faunal region situated about Monterey, Cal. They are very abundant during May, flying about the Monterey pines.

Dichelonycha vicina Fall.—I find this species in the coast belt of California as well as in the Sierras. I have specimens from the following coastal countries: Santa Cruz, Marin, and Sonoma. It is generally found towards the last of May and first of June, about a month later than the last *D. valida* Lec., a species with which it is often confused, and the specimens are generally to be found about the Douglas firs, whereas the others favor the redwoods.

Cremastochilus hirsutus n. sp.—Robust, castaneous, subopaque, clothed with yellowish pubescence, long on the elytra and median portion of pronotum, elsewhere moderate in length. Head moderately closely punctured posteriorly, finely and sparsely punctured in front, occipital region transversely depressed, widest across eyes and rapidly narrowing behind them; clypeus viewed from above, rounded at sides and almost transverse in front, with a well-marked carina at middle which, however, does not reach the anterior margin but projects forward free and horn-like, margin widely reflexed and forming an elevated semicircle as seen from in front, fimbriated at sides; submental plate transversely oval, pointed behind, the sides and posterior margin reflexed, the latter quite markedly. Thorax broad, almost as wide as the elytra, narrowed behind, sides arcuate in front, suddenly excavated posteriorly to the posterior angles, which are acute, of moderate length, and project directly backwards, anterior angles with a deep incision forming in front an auriculate lobe, anterior margin deeply semicircularly emarginate, disc trilobed, the median portion somewhat depressed, with a longitudinal impression at middle, surface coarsely but shallowly punctured and somewhat subopaque, the lateral portions coarsely and deeply punctured outwardly and smooth toward inner bounding sulci and posterior angles. Elytra with disc flat, sides nearly vertical, discal region with irregular, shallow, elongate, and more or less confluent variolate foveæ, surface more or less subopaque. Body beneath coarsely, sparsely punctured on thorax, finely punctured in transverse rows on abdomen, all markedly hairy as above. Legs not unusually dilated, anterior tibia with the upper tooth near the middle and the terminal long and curved, middle and posterior tibia of normal form, rather thick, more slender at base, and with small, acute dentation at middle; tarsi ambulatorial, cylindrical, and at least two thirds length of tibiæ. Length 12 mm., breadth 4.5 mm.

Type, a unique in my own collection, which was captured near Prescott, Ariz., June 11, 1910, by Mr. J. Aug. Kusche and by him kindly presented to me.

This markedly hairy species belongs with that group of species having a trilobed prothorax, and, according to Horn's latest revision of that group,* should come immediately after *C. saucius* Lec. It has, in common with that, the tibia of normal form, the anterior tibia with the upper tooth near the middle and the middle and hind tibiæ each with a small tooth at middle, as well as the straight hind angles of the prothorax. It differs, however, from that species in being very hairy and subopaque, whereas that is quite smooth and shining, in being proportionally broader, in having the anterior margin of the clypeus almost transverse, in contrast to the well-rounded and almost pointed one of the other, in having the clypeal carination not reaching the clypeal margin, but projecting forwards free and horn-like, in having the sides of the thorax strongly excavated just before the hind angles, and in having the hind angles themselves rather long, at least twice the length of those in the other.

Cremastochilus bifoveatus n. sp.—Black, opaque. Head densely punctured, front flattened, with broad shallow foveæ near sides, no defined margin anteriorly; clypeus as wide as head, feebly arcuate in front, rounded at sides, anterior margin broadly reflexed; submental plate smooth, transversely oval, pointed behind, flat at bottom, margins strongly reflexed. Thorax broader than long, four fifths breadth of elytra, broadest slightly behind middle, sides moderately arcuate, anterior angles fairly prominent in front, foveate and pubescent within but without transverse impression behind, posterior angles triangular, smooth, separated from pronotum in front by an oblique impression, and slightly retracted at sides, the outer margin forming a decided notch where it meets the sides of the thorax in front, disc somewhat flattened, with median longitudinal impression but vaguely defined, surface very coarsely punctured, more closely at sides. Elytra flat on the disc, very vaguely bicostate, surface coarsely foveate punctate. Pygidium with similar punctuation as elytra. Body beneath coarsely punctate, more shining. Legs ambulatorial, anterior tibiæ bidentate near the tip, middle and posterior slender at base, gradually broader to tip and with an acute spine on posterior margin just posterior to middle; tarsi elongate, but slightly flattened, and middle and hind pair almost as long as the tibiæ. Length 11.5 mm., breadth 5.25 mm.

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* "Descriptions of New North American Scarabæidæ," by George H. Horn, M.D., Trans. Am. Ent. Soc., Vol. XII (1885), p. 126.

Type and paratype in my own collection, collected at Flagstaff, Ariz., May 5, 1916, by Mr. T. N. Gooding and presented to me by Mr. Preston Clark. A third specimen in my collection which was collected at Vernon, British Columbia, in May, by Mr. W. H. Brittain, does not differ in the least from the preceding, which would indicate that the species has a wide range in the Great Basin.

In the table of *Cremastochilus* given by Horn* it would come nearest to *C. crinitus* Lec., and it is in fact quite closely related to that. It differs from it though in having the front of the head more coarsely punctured, not margined, and by possessing a shallow and isolated fovea at each side, the front in the other being distinctly margined and possessing a shallow depression within, which joins with the rather large lateral fovea, in having the thorax more transverse, with sides less rounded, the disc flatter and more coarsely punctured, the hind angles larger and with their outer margin not as distinctly continuous with the side margin of the prothorax in front.

Cremastochilus armatus Walk.—As surmised by Dr. Horn, this species is undoubtedly the same as *C. pilosicollis* Horn and, antedating it, will have to replace it. It is the characteristic species of the North Pacific States and western British Columbia and appears to divide into at least four well-marked races. The first, a large and very pilose form, ranges along the coast from British Columbia to Humboldt County in California. The second, a large and moderately hairless form, is the common form of the coast belt of middle California, while a more opaque form with the sides of the elytra more angulate replaces it in southern California, and a smaller form ranges throughout the Sierra Nevada region. These phases, of course, pass from one into another.

* "A Monographic Revision of the Species of *Cremastochilus* of the United States," by George H. Horn, M.D., Proceed. Am. Phil. Soc., Vol. XVIII (1879), p. 385.

NEW SPECIES OF PLATYLYGUS WITH A NOTE ON THE MALE OF LARGIDEA GROSSA VAN DUZEE (HEMIP. MIRIDÆ).*

By Harry H. Knight, Ithaca, N. Y.

Platylygus luridus (Reuter).—This species was first named by Reuter as a variety of *Lygidea rubecula* Uhl. from a specimen collected by Mr. Van Duzee at Lake Placid, New York. It not only represented a good species but was later described as the type of a new genus, *Platylygus* Van Duzee (1915). The writer has seen the type specimen and the figures of the male genitalia shown here (Fig. 1) are from a specimen collected by G. P. Engelhardt, July 10, Claremont, New Hampshire. The writer finds in an investigation of four species that the male genital claspers and the chitinous tip of the penis give specific differences, at the same time showing a close generic relationship. Only one specimen of *luridus* was available for dissection, the tip of the penis being discarded before it was noted that the other species showed specific differences in this organ, hence the lack of a drawing.

Platylygus intermedius new species.—Slightly smaller and more slender than *luridus,* more uniformly translucent yellowish brown, the genital claspers and chitinous tip of the penis distinctive of the species.

♂. Length 6.8 mm., width 2.57 mm. Structurally very similar to *luridus,* differing chiefly in the male genitalia and in being more slender and yellowish translucent in color, the cuneus and cell veins without reddish. Embolium and cuneus translucent, tinged with greenish yellow; last two segments of the antennæ and the tip of the second lightly infuscated; sides of the venter tinged with reddish, the genital claspers and chitinous tip of the penis (Fig. 2) distinctive of the species.

♀. Very similar to the male in coloration and only slightly more robust. The specimens were collected in company with *grandis,* both occurring on the two most common species of pine growing at the top of Mt. Lemon. In the series taken no tendency is shown to vary in size or coloration toward either *grandis* or *luridus.*

Holotype: ♂, July 26, 1917, Mt. Lemon, altitude 9,000 feet, Santa Catalina Mountains, Arizona (H. H. Knight); Cornell University Collection.

Allotype: Taken with the type.

Paratypes: 19 ♂, 23 ♀, taken with the types.

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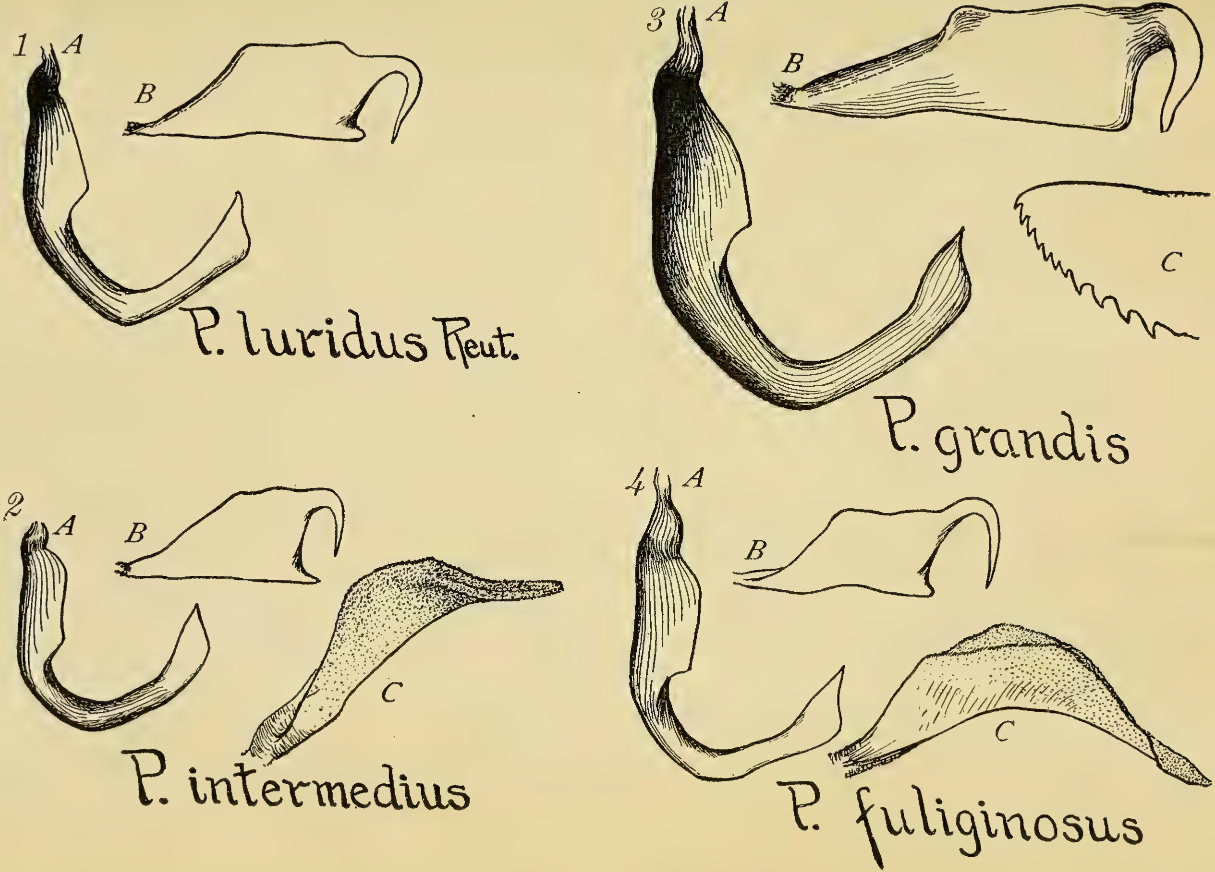
* Contribution from the Department of Entomology of Cornell University.


1
A
B
P. luridus Reut.
3
A
B
C
P. grandis
2
A
B
C
P. intermedius
4
A
B
C
P. fuliginosus

Genital claspers of *Platylygus*. *A*, left clasper, dorsal aspect; *B*, right clasper, internal lateral aspect; *C*, chitinous part at tip of penis.

Platylygus grandis new species.—Distinguished from *luridus* by its very large size, otherwise very similar in general structure and coloration; the male genital claspers and saw-toothed chitinous tip of the penis are distinctive of the species.

♂. Length 9 mm., width 3.36 mm. Rich yellowish brown in color (cockroach brown), translucent shining, narrow basal margin of the pronotum and the tip of the scutellum white. Head, sides of the body, femora, apical half of the antennæ more or less reddish brown; cuneus and cell veins reddish as in *luridus.* A chitinous saw-toothed blade at the tip of the penis and the shape of the right genital clasper with heavy claw (Fig. 3), distinctive of the species.

♀. Length 8.9 mm., width 3.5 mm., very similar to the male in coloration.

This species was collected in company with *intermedius* on the pines at the top of Mt. Lemon.

Holotype: ♂, July 26, 1917, Mt. Lemon, altitude 9,000 feet, Santa Catalina Mountains, Arizona (H. H. Knight); Cornell University Collection.

Allotype: Taken with the type.

Paratypes: 3 ♂, 5 ♀, taken with the types. ♂, ♀, July 30, 1915, Glen Alpine Creek, Tahoe, California (E. P. Van Duzee); also several other specimens taken at the same place by Mr. Van Duzee.

Platylygus fuliginosus new species.—Very similar in size and general structure to *luridus* but easily distinguished by the dark fuliginous to blackish color; genital claspers and chitinous tip of the penis distinctive of the species.

♂. Length 6.7 mm., width 2.57 mm. Dark fuliginous to nearly black, shining, the lighter forms having only the scutellum, cuneus, femora, and sides of the body blackish; narrow basal margin of the pronotum and tip of the scutellum pale to white; membrane tinged with fuliginous, veins darker. Male genital claspers and chitinous tip of the penis (Fig. 4) distinctive of the species.

♀. Usually lighter colored than the male but otherwise very similar.

This interesting species was taken on pines at the top of Mt. Lemon in company with certain species of *Camptobrochis,* one of which it simulated very closely in coloration.

Holotype: ♂, July 26, 1917, Mt. Lemon, altitude 9,000 feet, Santa Catalina Mountains, Arizona (H. H. Knight); Cornell University Collection.

Allotype: Taken with the type.

Paratypes: ♂, ♀, taken with the types; ♂, ♀, July, Huachuca Mountains, Arizona (H. G. Barber).

Largidea grossa Van Duzee.—This species was described by Mr. Van Duzee (1916) from a single female specimen taken near Lake Tahoe, California. The writer collected on Mt. Lemon what is undoubtedly the male of this species and after a comparison with the male of *L. davisi* wishes to point out the distinguishing characters.

♂. Length 5.4 mm., width 2.14 mm. Differs from *davisi* in having the second antennal segment longer (1.77 mm.), equal to the length of the pronotum plus the head to the front margin of the eyes; rostrum reaching to the front margin of the middle coxæ; apical half of the left genital clasper very broad and spatulate, twice as broad as in *davisi*.

Allotype: ♂, July 26, 1917, Mt. Lemon, altitude 9,000 feet, Santa Catalina Mountains, Arizona (H. H. Knight).

A NEW SPECIES OF HARTOMYIA FROM ILLINOIS (CERATOPOGONIDÆ, DIPTERA).

By J. R. Malloch, Urbana, Ill.

The type specimen of the species described in this paper is deposited in the collection of the Illinois State Natural History Survey, Urbana, Illinois.

Hartomyia lutea sp. n.—Female: Pale yellow, shining; eyes black. Eyes almost touching above; antennæ about three fourths as long as entire body, shortest flagellar joint (second) at least three times as long as wide, basal joint twice as long as second. Thorax with a few slender black bristles. Legs slender, all tibiæ with rather sparse black setulose hairs; basal tarsal joint on all legs nearly as long as next four together; fourth joint obcordate; outer tarsal claw on all tarsi about three times as long as inner; fifth tarsal joint unspined ventrally. Third vein ending at five sixths the wing length; second branch of radius one third from base of third; petiole of media very short.

Length, 2 mm.

Type locality, Elizabeth, Ill., July 7, 1917 (J. R. Malloch).

This species differs from *gilva* Coquillett, to which it is most closely allied, in having the tarsal claws unequal in size. No other described North American species than the above two is entirely yellow.

NOTES ON CHLOROPIDÆ, WITH DESCRIPTIONS (DIPTERA)

By J. R. Malloch, Urbana, Ill.

I described the genus *Oscinoides* in 1916 to include one species, *arpidia* Malloch.* Since the description appeared I have taken four specimens belonging to the genus, all of which differ from each other strikingly in color. One example only agrees with the type. Structurally they agree so closely that I consider it probable that they are but color varieties of one species.

The present seems to be an opportune time to mention a generic character which was not given when the original description was published. The ocellar bristles are strong and widely, laterally, divergent, differing in this respect from those of *Gaurax* and allied genera, which are either parallel or cruciate and generally directed backward.

I give a key to the four forms herewith, naming them as they are so distinctively marked. As they agree so closely in structure it is not necessary to give full descriptions, the original description of the type being sufficient for their identification.

Key to Varieties of *Oscinoides arpidia* Malloch.

1. Thorax, including scutellum, and abdomen glossy black; frons, except narrow front margin, and back of head glossy black; female, *atra* var. nov.
   At least the scutellum yellow 2
2. Scutellum, anterior lateral angles of mesonotum, and two small round areas near posterior margin of disc of latter yellow, remainder of thorax glossy black; female ....*humeralis* var. nov.
   A much larger proportion of disc of mesonotum yellow 3
3. Palpi yellow; frons except ocellar triangle yellow; thorax yellow, with 5 abbreviated vittæ, the median one broad and extending slightly beyond middle, its anterior portion connected with submedian vitta, the latter narrower than median, and broken at suture; lateral vitta a short streak above wing base; pleuræ yellow, with a longitudinal blackish streak on lower margin of mesopleura, and the upper portion of sternopleura of same color; antennæ almost entirely yellow; male, *elegans* var. nov.

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* Bull. Brooklyn Ent. Soc., Vol. 11, p. 86.

Palpi black, either entirely or in larger part; frons black on upper half; mesonotum with black marks similar to those on *elegans;* but the median vitta is acute posteriorly, and the markings are less clearly defined; pleuræ black except on anterior margin; antennæ infuscated at insertion of arista; female ....*arpidia* Mall., typical.

The localities and dates of the varieties are as follows:

atra, Dubois, Ill., May 23, 1917.
humeralis, Dubois, Ill., May 22, 1917.
elegans, Freeport, Ill., July 4, 1917.
arpidia, Urbana, Ill., June 1, 1916, type; Aberdeen, S. D., July 12; Stratford, Ill., June 22, 1917.

With the exception of the paratype of the type form from South Dakota the specimens were taken by the writer. No data as to nature of habitat of the former is available; the others were all taken in woodlands, and, with the exception of the type specimen, in the vicinity of streams. The larval habits are unknown.

Dasyopa gen. nov.—Generic description: Closely resembles *Madiza* (*Siphonella* auct.), differs in having the mesopleuræ hairy on the upper posterior portion, and the hind tibiæ without the sensory area.

Ocellar bristles usually convergent and directed slightly backward; eyes hairy; anterior angle of cheeks much produced; proboscis elongated, geniculated; arista short pubescent. Mesopleuræ hairy above; humeral bristles 2–3 in number; a transverse series of six bristles near posterior margin of mesonotum; scutellum convex. Hind tibiæ without well defined sensory area. Wing venation as in *Madiza.*

Genotype, **Dasyopa pleuralis** sp. nov.—Male and female: Black, ground color obscured by yellowish gray pruinescence. Frons yellowish gray, sometimes slightly ferruginous; ocellar triangle slightly shining, dark gray, in the female usually with the posterior lateral angles yellowish; antennæ and arista black; proboscis black; palpi rufous yellow; cheeks colored as frons, with a dark line on lower margin. Dorsum of thorax usually with four indistinct vittæ which are but slightly darker than disc, lateral margins, especially anteriorly, yellowish; apex of scutellum sometimes of same color; pleuræ obscurely yellowish, a large spot on lower margin of mesopleuræ and the lower half of sternopleuræ glossy black; postnotum shining black. Abdomen subopaque, black. Legs blackish brown, fore coxæ, apices of femora and bases of tibiæ yellowish. Wings clear. Halteres cream-colored.

Frons slightly decliventous, half the head width; triangle pointed, extending half-way to anterior margin of frons; orbits each with 6–8 black setulæ on upper two thirds of their length; frons with numerous short, pale hairs; antennæ of moderate size, third joint with apex rounded;

arista short, not as long as width of frons, its second joint swollen and elongated; cheek half as high as eye; vibrissa short; palpi large, slender, slightly bristly. Dorsum of thorax rather densely short haired, with a more or less distinct depression between vittæ; scutellum with eight marginal bristles; sternopleura with hairs on the greater part of its surface. Abdomen stout; male hypopygium small. Legs normal; mid tibiæ with short apical bristle. Distance from humeral vein to apex of first as long as next section of costa; third vein ending before tip of wing, fourth ending in apex, these veins slightly convergent before apices then diverging; last section of fifth vein 2½–3 times as long as penultimate section of fourth; inner cross vein proximad of apex of first.

Length, 2–2.5 mm.

Type locality, Meredosia, Ill., August 19 and 22, 1917. Paratypes, Bluffs, Ill., August 19, 1917; Dubois, Ill., August 9, 1917.

Stenoscinis gen. nov.—Generic characters: Closely related to *Botanobia* (*Oscinis* auct.), differing in having the ocellar bristles directed forward, cheeks very much reduced, linear, not produced anteriorly; frontal triangle very large, extending the whole length of frons, obtuse anteriorly, anal angle of wing absent, body long and slender; hind tibiæ with distinct sensory area. Genotype, *Oscinis longipes* Loew.

HOMOCORYPHUS MALIVOLANS SCUDD. IN TEXAS.

By A. N. Caudell, Bur. of Ent., U. S. Dept. Agric.

The above species has been recorded from Florida, North Carolina and Virginia. Now Mr. J. D. Mitchell sends a female taken by himself at Victoria, Texas, on July 22, 1917. This is an extension of many miles westward of the known habitat of this interesting insect. This Texan specimen is a long-winged individual and shows no characters differing from a macropterous female taken in company with the ordinary short-winged form at Tappahannock, Virginia, on July 14, 1915, by Dr. Henry Fox and by him deposited in the National Museum. I believe the dimorphism of this species has not been recorded hitherfore. Dr. Fox makes no mention of the matter in his report on his Virginian collections,* though noting the total number of both sexes taken and furnishing certain biological information concerning them. I have seen no long-winged specimens of the male. The macropterous females differ from short-winged specimens only in the possession of fully developed organs of flight, which, however, serves to give the insect an appearance of being larger and more bulky than its brachypterous relatives. The wings are of equal length with the elytra, which are rounded apically and extend far beyond the tip of the abdomen, but does not attain to the tip of the ovipositor. The elytra of the Texas specimen measure 50 mm., those of the Virginia individual a couple of mm. less.

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* Proc. U. S. Nat. Mus., Vol. LII, pp. 199–234 (1917).

PAPILIO THOAS FEEDING ON RUTA GRAVEOLENS.

By George P. Engelhardt, Museum, Brooklyn, N. Y.

On October 21, while in the Old Fashioned Flower Garden, Prospect Park, Brooklyn, N. Y., my attention was drawn to the succulent growth of an herb with deeply cut, blue-green leaves and a number of upstanding stalks which plainly bore evidence of recent defoliation. Upon examination three larvæ of *Papilio thoas* in various stages of growth and one small larva of *Papilio polyxenus* were found. Injury to the plant further showed that it had given support to a much larger number of larvæ.

With only a limited knowledge of botany the determination of the herb no doubt would have given me considerable difficulty, but taking a cue from the known food plants of *P. thoas* (*Citrus*, prickly pear, hop tree, all members of the Rutaceæ or Rue family), the matter really proved very simple. It is *Ruta graveolens,* a strong-scented, acrid herb, indigenous to the Old World, where it was well known for medicinal properties to the ancients and in mediæval times was in common use as a witch's drug.

Wherever procurable *Ruta graveolens* should prove an excellent substitute for the native foodplants of *P. thoas,* because of its rank growth and hardiness when placed in a breeding jar.

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BULLETIN
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BROOKLYN ENTOMOLOGICAL SOCIETY

Vol. XII April, 1918 No. 2

THE GRASSHOPPERS OF THE OLD TESTAMENT.

By R. P. Dow, Brooklyn, N. Y.

The plague recorded in Exodus, X, cannot be considered more literally than its predecessors, but it brings in a word signifying locust or grasshopper, which is one of several in classic Hebrew and which invites extensive comparisons. The passage reads: "To-morrow will I bring the locusts unto thy coast: And they shall cover the face of the earth, that one cannot be able to see the earth: and they shall eat the residue of that which has escaped, which remaineth unto you from the hail, and shall eat every tree which groweth for you out of the field: And they shall fill thy houses, and the houses of all thy servants, and the houses of all the Egyptians; which neither thy fathers, nor thy fathers' fathers have seen, since the day that they were upon the earth unto this day.

". . . Stretch out thy hand over the land of Egypt, for the locusts, . . .

". . . when it was morning the east wind brought the locusts.

"And the locusts went up over all the land of Egypt, and rested in all the coasts of Egypt: very grievous were they; before them there were no such locusts as they, neither after them shall be such.

". . . a mighty strong west wind, which took away the locusts, and cast them into the Red Sea; there remained not one locust in all the coasts of Egypt."

The Hebrew word is *arbeh,* possibly from a verb *rabah,* to multiply or become numerous, hence to swarm. The Allegorist knew full well the meaning of his text. We in the eastern United States can have no conception of the terror of the frequent swarms of the migratory locust in eastern Asia and northern Africa, where fields of grain are eaten to the ground in an hour, where the ravage of a single swarm forced almost every horse in Mesopotamia into starvation, where there is recorded a pile of dead locusts, sixty feet wide, three feet high, and a hundred miles long, the stench from which offended the senses for several hundred miles. The modern Arabic word *arbah* is a very general term for locust, just as our own unscientific laymen apply the word grasshopper indiscriminately to all species of a dozen families of the Orthoptera.

The word *arbeh* next appears in Leviticus, XI, 22: "ye may eat; the *arbeh* after his kind, the *solam* after his kind, and the *chargol* after his kind, and the *chagab* after his kind. But all other flying creeping things, which have four feet, shall be an abomination unto you."

From time immemorial almost all peoples have eaten grasshoppers, either dried, pickled or freshly boiled. They have been food staples with North and South American Indians, Kamchatkans, Arabs, and many others. They were highly esteemed by the Greeks during the most intellectual period and recipes are extant for preserving them for winter use. Beetles have not frequently been used for human food. The Romans considered a certain beetle larva as a great delicacy, generally pickling it. They called it *Cossonus,* and it was probably one of the large Scarabaeids, certainly not the evil-smelling goat moths to which Linnæus erroneously applied the name. The adult *Melolontha* is still eaten, although mostly by children.

In Entomological News some years ago there appeared a contributed short note, stating that beetles were only once mentioned in the Bible, and that in an edible capacity, etc. The translators chosen by King James were the most eminent scholars of the time, but entomological knowledge was extremely limited. Even the Theatrum Animalium of Thomas Moufet had not been published, and there were not enough words in the language to fill requirements. So the translators called the *arbeh* locust, as they already had in Exodus. For *solam* they either found or invented the term bald locust, certainly harmless translating. For *chagab* they employed the familiar word grasshopper. For *chargol* the task was less easy. The Orthopterous names had run out, and, too, there is no other occurrence in literature of the word *chargol.* It might mean almost any edible insect, and no etymological kin has ever been discovered. So the translators took the most innocuous word in their vocabulary and called the beast *beetle.*

Similar difficulties assailed the King James translators when they came to Joel. It may be well to dwell a little upon these passages for no Homer ever rose to heights above the simple grandeur of this Hebrew minor Prophet.

Joel 2–4: "Hear this, ye old men, and give ear, all ye inhabitants of the land. Hath this been in your days, or even in the days of your fathers?

"Tell ye your children of it, and let your children tell their children, and their children another generation."

The next verse as translated by Rotherham, the Emphasized Bible:

"That which was left by the creeping locust hath the swarming locust eaten, and that which was left by the swarming locust hath the grass locust eaten; and that which was left by the grass locust hath the corn locust eaten."

Then to return to the King James version, Joel, II, 3–4: "A fire devoureth before them; and behind them a flame burneth; behind them a desolate wilderness; yea, and nothing shall escape them. The appearance of them is as the appearance of horses, and as horsemen, so shall they run."

In Joel, II, 25, the same words recur: "And I will restore to you the years that the locust hath eaten, the cankerworm, and the caterpillar, and the palmerworm, my great army which I sent among you."

How far Joel, mournful singer of Israel, discriminated in his own mind in these passages between one species of insect and another is not a profitable speculation. The import is clear enough. Some theorize that locusts in different stages of development are referred to, others make more variety by introducing Lepidopterous caterpillars for two of them. The names in

Hebrew in order of occurrence are *gazam, arbeh, jalek,* and *chasil.*

The Septuagint found trouble. There were not familiar words enough in Greek to go around. Entertaining the idea that at least one mention was a caterpillar, they employed for *gazam* the Greek *kampe,* the generic term for caterpillar, familiar at all events since the writing of Aristotle. St. Jerome adopted their word, translating as *eruca,* the Latin word for Lepidopterous caterpillar, invariably used by Réamur, Swammerdamm, Godaert, de Merian, and others of the leading pre-Linnean insect students. The King James translators adopted the earlier interpretations, but on account of the paucity of words used indefinite terms probably culled from English works on insects.

"That which the palmer-worm hath left hath the locust eaten; and that which the locust hath left hath the cankerworm eaten; and that which the cankerworm hath left hath the caterpillar eaten."

For some unexplained reason they applied the general term caterpillar for *chasil,* and for *gazam* they had to use a special kind of caterpillar, palmerworm. For *jalek* they had to specify some other kind of caterpillar, cankerworm, which is good old English.

For *arbeh,* the King James translators made a curious error. In thirteen places they rendered it as locust, in four as grasshopper. The best references are: I Kings, VIII, 37: "If there be pestilence, mildew, locust (*arbeh*), or if there be caterpillar (*chasil*) in the land." In II Chronicles and Psalm LXXVIII the words are used in the same way. In Psalm CV "the *arbeh* came and caterpillars (*jelek*), and that without number." Notice another little error in the Authorized Version, caterpillar being used for *chasil* and *jelek,* disregarding the discriminations made elsewhere. Psalm CIX, "I am tossed up and down like the *arbeh.*" Proverbs, XXX, "The *arbeh* have no king, yet they go forth all of them by bands." Judges VI and VII, "they came as grasshoppers for multitude." Job, XXXIX, "afraid as a grasshopper." Jeremiah, XLVI, "more than the grasshoppers and innumerable."

There is another word, occurring thrice in the Old Testament, which the King James translators regarded as locusts or grasshoppers, *gob,* plural *gobim.* In Isaiah, XXXIII. "Your spoil shall be gathered like the gathering of the *chasil;* as the running to and fro of *gobim* shall he run." Notice that the *gobim* seem to be runners, which is only metaphorically the case with swarms of locusts. In Amos, VII, 1, "the Lord formed grasshoppers (gobai) in the beginning of the shooting up of the latter growth of the king's mowing." In Nahum, III, 15–17, "the sword shall eat thee up like the cankerworm: make thyself many as the cankerworm (*jelek*), make thyself many as the *gobai.* The cankerworm spoileth, and fleeth away. Thy crowned are as the locusts, and thy captains as the great grasshoppers (*gobai*), which camp in the hedges in the cold day, but when the sun ariseth they flee away."

To agree with many commentators that *gobai* are "locusts in their caterpillar state" seems rather absurd, even passing by the allusion to Orthopterous larvæ as caterpillars. But, too, it is not easy to understand why a prominent traveler and scholar should waste time trying to identify *arbeh,* having the Arabic *arbah* before him, with a particular gregarious locust which he quotes with the present-day Arab name of *djerad.*

The only occurrence of *gazam* besides that already quoted is in Amos, IV, 9, "when your olive trees increased the palmerworm devoured them." By following the Septuagint and the Vulgate, and regarding *gazam* as caterpillars, one is reminded of a secondary Greek word for caterpillar, *phalœna,* those which radiate out in devastating swarms like the ten fingers, but these seem to be cut worms, ground dwellers and not likely to defoliate olive trees.

There is only one occurrence of *chargol.* The word is also present-day Arabic and is interpreted as "innumerably swarming," *i. e.,* presumably one of the many locust species. The Septuagint rendering as *ophiomaches* is a reminder of a curious Greek superstition, mentioned by Aristotle, that certain locusts fought and killed snakes. The Septuagint probably took their cue from Aristotle.

The Septuagint erred by translating *jalek* as *bruchus* five times out of eight occurrences. The Aristotelian conception of *bruchus* is not our beetle now known by that name. The favorite

Mediæval interpretation was as the larva of a Pyralid moth, the *ips* of Aristotle, *convolvulus* of Pliny, *volucra* of Columnella, *involvulus* of Plautus. These beasts were principally known to the Romans from those which webbed up the grape leaves. We can catch a vague clue from the wording in Jeremiah, LI, 27, where it is called "rough." This might mean hairy. In Revelations, IX, 3, a highly allegorical passage, there is mentioned locusts having power like scorpions, shaped like horses, teeth like lions, and "hair as the hair of women." The Arabs keep this as a popular superstition, having several words to describe a hairy locust. If any word in the Old Testament, sometimes regarded as meaning some kind of Orthopterous crop pest, might be properly a lepidopterous larva it is surely this *jelek,* a hairy caterpillar commending itself to the simple early observers as such, no other description being so terse and applicable.

As *solam* occurs once only, it can be judged only by the context as a flying, creeping thing, permissible as food, and mentioned in Orthopterous company. All commentators agree in placing it as a *Gryllus* or locustid.

The last of the words possibly meaning a locustid is the *tzaltzal,* mentioned only in Deuteronomy, XXVIII, 42, "all thy trees and fruit shall the locust consume." The onomatopœa of the name suggest the orthopteron, but one wonders why a new name for something so like the *arbeh* or *gob.* The Chaldean Targum translates as *zebub,* the general term for insect.

KEY FOR THE SPECIFIC IDENTIFICATION OF THE FEMALES OF THE DIPTEROUS GENUS HYDROTÆA FOUND IN NORTH AMERICA.

By J. R. Malloch, Urbana, Ill.

The key presented herewith includes all species of *Hydrotæa* which have been recorded as occurring in North America with the exception of *bispinosa* Zetterstedt, and *cressoni* Malloch. I have seen no examples of *bispinosa* from this country. A specimen in our collection so named by Coquillett, is *metatarsata*

Stein, female. The record of the occurrence of *bispinosa* in North America requires confirmation. The female of *cressoni* Malloch is unknown.

I have included *scambus* Zetterstedt in the key, basing the record upon a female specimen taken at Grant, Colorado, July 13, 1916 (E. C. Jackson).

The male of this species was not included in my key to this sex in a previous paper in this BULLETIN,* as I did not then know of its occurrence in this country. The male will run down to caption 3 in that key and may be separated from *occulta* by the bare eyes and from both *occulta* and *acuta,* the two species in the caption, by the curved hind femora and by the tibiæ, the latter being thin to about the middle and then suddenly thickened, with a strong apically curved thorn at the beginning of the thickened part, and the anterior surface furnished with a series of long bristly hairs.

This species is rare in Europe and not heretofore recorded from North Amercia. Although I have seen only the female, the species is so characteristic that there is little doubt as to its identity.

It may be of interest to record the occurrence of *militaris* Meigen in British Columbia. This European species was recorded by Stein from the eastern states.

The females of this genus may be separated from those of Phaoniinæ by the following combination of characters: Frons broad, occupying at least one third the head-width; orbits more or less glossy, well differentiated, with at least the anterior supraorbital bristle directed forward (except in my specimen of *ciliata*); interfrontal cruciate bristles well developed; cheeks almost linear; mesonotum with 4 pairs of postsutural dorso-centrals; sternopleura with 2 bristles (1:1); apical abdominal segment without thorns; legs with few bristles; sixth vein incomplete.

The most closely related genera so far known to occur in this country are *Ophyra* and *Pogonomyia.* The latter has conspicuously bristled tibiæ and much stronger prealer bristle; the former has the ocellar triangle carried well beyond the cruciate bristles

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* Vol. XI, December, 1916, p. 109.

(*leucostoma*), the anterior 2 pairs of postsutural dorso-centrals much more reduced in size, and the pteropleura pubescent.

Key to Species.

1. Halteres yellow 2
   Halteres black 3
2. Fore tibia with an antero-ventral bristle; glossy blue-black species with apical dorsal abdominal segment white pruinescent, *ciliata* Fabricius.
   Fore tibia without an antero-ventral bristle; dull black or yellowish species, without conspicuous white pruinescence on apical segment 2*a*

2*a*. Opaque grayish black species with black legs and palpi, *irritans* Fallen.
   Thorax gray, abdomen yellowish at base; legs and palpi yellow, *succeedens* Stein.

3. Mid tibia with a strong ventral bristle about middle 4
   Mid tibia without ventral bristle 5
4. Fore and mid tibiæ each with a short antero-dorsal bristle; hind femora with a series of short hairs at base and apex and 2 long fine hairs, one at one third and the other at two thirds from base; ventral bristle on mid tibia much beyond middle..*militaris* Meigen.
   Fore and mid tibiæ without antero-dorsal bristle; hind femora without the above-mentioned hairs; ventral bristle on mid tibia before middle ....*scambus* Zetterstedt.
5. Mid tibiæ with a bristle on anterior side 6
   Mid tibia without a bristle on anterior side 8
6. Mid tibia with 2 bristles and a series of short setulæ on antero-dorsal surface; dorsum of thorax opaque gray with 3 broad brownish vittæ ....*palaestrica* Meigen.
   Mid tibia with 1 bristle on antero-dorsal surface; dorsum of thorax shining, distinctly quadrivittate anteriorly 7
7. Ocellar triangle grayish, the region immediately surrounding ocelli polished black; mid femora without long bristles at base ventrally, *dentipes* Fabricius.
   Ocellar triangle shining black, only the posterior lateral angles gray pruinose; mid femora with several long bristles on antero- and postero-ventral surface at base ....*houghi* Malloch.
8. Hind tibia with 1 bristle near apex on postero-dorsal surface; ocellar triangle, unless abraded, with dense gray pruinescence so that it appears almost entirely opaque ....*armipes* Fallen.
   Hind tibia with a bristle at or beyond middle on postero-dorsal surface in addition to the one near apex 9
9. Presutural acrostichals consisting of 2–3 pairs of short stout bristles and a few interspersed short setulæ 10
   Presutural acrostichals consisting of from 4 to 6 series of short setu-

læ, the posterior 3–4 on each side sometimes stronger than the others 12

10. Ocellar triangle opaque or subopaque, nowhere polished; acrostichal bristles long and slender, the interspersed hairs rather numerous and regular .... *meteorica* Linné.

Ocellar triangle polished, acrostichal bristles short and stout, the interspersed hairs sparse and irregular 11

11. Large species, 4.5 mm. in length; mid tibia with 3 posterior bristles; hind tibia with 3–4 antero-ventral bristles.......... *occulta* Meigen.

Smaller species, 3.5–4 mm. in length; mid tibia normally with 2 bristles; hind tibia with 2 antero-ventral bristles........... *acuta* Stein.

12. Ocellar triangle glossy only on a small space in front of ocelli; mid tibia with 2 posterior bristles; mid tarsi slender, basal joint about 10 times as long as its diameter, the ventral surface with short closely placed subdepressed bristles............... *unispinosa* Stein.

Ocellar triangle almost entirely polished; mid tibia normally with 3 posterior bristles; mid tarsi moderately stout, basal joint about 8 times as long as its diameter, the ventral bristles long, rather widely separated and suberect.......................... *metatarsata* Stein.

A NEW TIGER-BEETLE FROM TEXAS.

By Wm. T. Davis, New Brighton, Staten Island, N. Y.

In the summer of 1917 I received a tiger-beetle from Tascosa, Oldham Co., Texas, collected by Miss Mildred McGill, that was new to my collection. It also proved to be new to Mr. Charles W. Leng and to Mr. Edward D. Harris. Mr. Harris compared the insect with specimens in his extensive collection and concluded that it belonged near *Cicindela roseiventris* Chevrolat from Mexico, but was not that species, nor was it like his series of the subspecies *mexicana* Klug. *Cicindela belti* Bates from Costa Rica is a synonym of *mexicana*, according to Dr. Walther Horn. Another subspecies of *mexicana* is *linearis* W. Horn, also from Costa Rica. In the description of this insect it is stated that the margins of the female elytra are much dilated at middle; markings composed of exceedingly fine lines, but not reduced. In the three males and three females from Tascosa, the latter have the elytra slightly dilated at the middle, and the markings, while fine are reduced, as will be seen by the accompanying illustration of the type. A more detailed description of this insect is as follows:

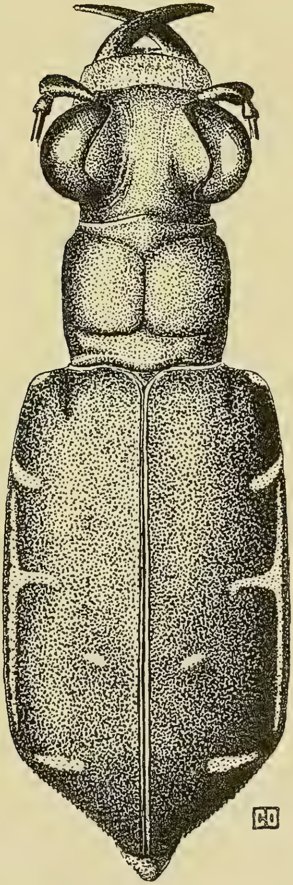
Cicindela tascosaensis new species.—Type male, and allotype female, from Tascosa, Texas, May, 1917. Davis collection.

Black or nearly black above with the following markings on the elytra straw-colored. Humeral lunule, separated from marginal line; marginal line extending along the middle part of the elytra, but not connected with the subapical dot, which is transverse; the middle band bent slightly downward but not connected with the discal dot. The antennæ, dorsum of the head, and pronotum, are black, or nearly so; the jaws are bronzed with the tips black. The elytra are feebly granulose, and in one of the paratypes, which is slightly paler in color probably owing to immaturity, they are punctured. The posterior margins of the elytra are conspicuously serrulate in both sexes; the sutural angle is spinate, and the tip transversely truncate in the female, obliquely so in the male. Beneath black, with white hairs on the palpi; several long hairs on the under side of the head, more profusely haired on the prosternum and along the sides of the abdomen, which has the last two (sometimes three) segments reddish. The coxæ and legs also bear white hairs.

Length of male type 10.5 mm.; of female allotype 10 mm.

This insect has somewhat the dorsal coloring of *Cicindela klugi* Dejean, from Mexico, but the markings are much finer than in that species, and the eyes are much more protruding, being about as prominent as in our *rufiventris* or *abdominalis* from New Jersey and Virginia. Mr. Leng has pointed out that the most characteristic feature of the color pattern is the transverse subapical spot.

Paratypes, collected at the same place and time, have been placed in the collections of Mr. Harris and Mr. Leng. In sending me the lot of insects which included the Cicindela here described Miss McGill stated that she had found most of them on the "sand rocks."



Cicindela tascosaensis, Davis

A NEW SPECIES OF LEPTOGLOSSUS: A NEW BLISSUS AND VARIETIES.

By H. G. Barber, Roselle Park, N. J.

Leptoglossus brevirostris n. sp. *Leptoglossus* sp.?—Barber, Bull. Mus. Brooklyn Inst. of Arts and Sci., 266, 1906. Color fusco-rufous or dark ferrugineus-brown, with the head, two suboval cicatrices anteriorly on the pronotum, humeral area, connexivum, two stripes on the basal segment of the antennæ, apical part of the femoræ piceous. The three apical segments of the antennæ, a stripe along the outer and inner surface of the basal segment, three longitudinal stripes on the head, the lateral margins of the pronotum anteriorly and between the cicatrices, a transverse wavy line on the middle of the corium, apex of scutellum, incisures of the connexivum, femoræ above towards base, tibiæ for the most part, and a few spots on the darker tibial expansion, pale or ochraceous. Head and pronotum anteriorly with incumbent silver-white pubescence and a spare covering of dark pilose hairs.

The tylus forming a somewhat blunt, rounded, elevated lamina, slightly exceeding the jugæ. The second segment of antennæ one third longer than the third, fourth segment long, a little longer than the second. Rostrum short, just reaching past middle coxæ, second segment subequal to basal and about two and one half as long as third which is one third shorter than blackened apical one. The pronotal humeral angles prominently expanded and elevated into broad acuminate acute angles, margin posterior, to which is often finely dentate or serrate; the anterior declivous face of the posterior lobe of the pronotum almost vertical, the surface closely and coarsely punctate and provided with an obscure longitudinal median carina posteriorly. Veins of the corium wine-red. The transverse yellowish fascia wavy, following the line of the transverse veins. Membrane somewhat bronzy. Beneath dirty testaceous, maculate with fuscous spots. The legs somewhat densely pilose. Posterior femora about reaching apex of abdomen, provided outwardly with two rows of widely separated, short, black, backwardly pointing teeth and inwardly with two rows of longer, posteriorly directed spines, five or six in the lower row and three in the upper series increasing gradually in size outwardly. The expansion of the posterior tibia wide, bronzy purple-brown, with a few pale spots, occupying more than one half of the length but not two thirds of the tibia, tridentate in both sexes, the inner expansion less than one third the diameter of the outer expansion and one fourth shorter, calloused all along the margin, rather abruptly terminating and apically furnished with one to several teeth; simple apical part of the tibia armed inwardly with several scattered, short, blunt teeth.

Length ♂ 12 mm., ♀ 14 mm.; width of pronotum ♀ 5 mm.

Described from one ♂ and seven ♀'s collected by me in the Huachuca Mts., Arizona, August, 1905; one ♀ St. Thomas, Brownsville, Tex., collected by Mr. Charles Schaeffer; and one ♂ from Sonora Co., California, in the collection of Mr. J. R. de la Torre-Bueno.

This species falls in the section "gg" of Stal's arrangement of the genus in Enum. Hemipt., I, 164, because of the extreme shortness of the rostrum, which will at once separate this from any other known United States form. The steep anterior declivous face of the posterior lobe of the pronotum and the extremely wide and short tibial expansion will further differentiate the species. Mr. Heidemann and myself formerly referred this to *Leptoglossus stigma* Hbst. var. *minor* Dall.

Thyreocoris rastratus Stal. Mr. E. P. Van Duzee has placed this in his recent catalogue upon the record which I transmitted to him. It will therefore be necessary to publish the facts concerning this new addition to our fauna. A single ♀ from Brownsville, Texas, collected by Mr. O. Dietz in June, 1901, is in my collection. It is very unlike any other form from the United States. It is very short and broad, dull black, finely rastrate on the pronotum and scutellum laterally. The head is obtusely triangular and except at base very closely and evenly punctate all over. Originally described by Stal from Brazil and later, Stett. Ent. Zeit., XXIII, 1862, p. 94, he referred to this species, with doubt, a Mexican specimen received from Signoret. Distant, Biol. Cent. Amer., 1880, records this species from British Honduras and Guatemala, so without doubt Stal was correct in his diagnosis of the Signoret specimen.

Blissus occiduus n. sp. Brachypterous form closely related to the European brachypterous *B. doriæ* Ferr., which it resembles in size, color and general appearance.

Color black, sometimes verging into dark castaneous on the head, pronotum, connexivum and venter. Apex of tylus, first three segments of the antennæ and base of the fourth, rostrum, and legs ochraceous. Membranous part of hemielytra in macropterous forms whitish with the veins pale stramineus and a piceous spot before apex. Membrane concolorous with the membranous part of the corium. Head and pronotum covered with short white tomentose hairs Corium more sparsely pilose. Antennæ and legs finely pilose. Dorsal part of abdomen and beneath clothed with fine incumbent silvery hairs.

Head short and broad, much deflexed before. Eyes not so prominent as in *B. leucopterus* Say. Antennæ with the second segment one third longer than third, fourth segment about one third longer than second, pale at base and very lightly incrassate. Lightly incrassate fore femora unarmed.

Tip of rostrum reaching to between the hind coxæ, first segment passing a little the base of the head, a little shorter than second, which is almost subequal to the third.

Macropterous female: Pronotum plainly transverse, lateral margins gently rounding anteriorly from the humeral angles. Scutellum very transverse. Apex of the corium reaching to the posterior margin of third abdominal segment. Membrane damaged in the single macropterous specimen, but apparently does not reach apex of abdomen.

Brachypterous male and female: Pronotum strongly transverse, lateral margins posteriorly parallel to each other, a little anterior to the middle strongly and somewhat abruptly rounded to the anterior margin. Hemielytra extremely short, not twice the length of the scutellum, apical angle very obtuse, scarcely reaching beyond posterior margin of the metasternum, apical margin lightly oblique, forming almost a continuous line with the opposite margin of the scutellum; the veins rather broadly embrowned with the reduced membranous areas obscurely pale. The membrane pale, very much aborted, scarcely as long as the width of the clavus, apical margin gently rounded, reaching the basal margin of the second abdominal segment. Exposed dorsum finely transversely rugose with fine incumbent silvery pubescence. Venter finely punctate. Sometimes the acetabulæ, posterior margin of the metasternum and the venter paler.

Length 3 mm.

Described from one macropt. ♀, Ft. Collins, Col., June 12, 1902 (Type), one brachypt. ♂, Ft. Collins, Col., May 6, 1898, and one brachypt. ♀, Ft. Collins, Col., June 12, 1902, all collected by Dr. E. D. Ball; two brachypt. ♀'s collected by G. P. Cockerell at Geronimo, N. Mex., March 9, 1902 (U. S. N. M.).

This species is smaller than the typical western form of *B. leucopterus* Say, the head is more deflexed, the eyes less projecting, the antennæ much shorter and differently colored, the terminal segment being relatively shorter, the disk of the pronotum flatter, the corium as well as the membrane is much more abbreviated in the brachypterous form than I have ever seen it in *B. leucopterus*. In this last respect it resembles *B. doriæ* Ferr. of Europe.

Blissus leucopterus Say was described from Virginia. Specimens from that locality resemble those from Nebraska, Kansas and neighboring western states; in the west only macropterous forms occur, according to Webster, 1898. Dr. E. D. Ball has a brachypterous female from Manitoba in his collection. Fitch, second Rept. Trans. N. Y. St. Agr. Soc., 1856, recognizes nine mostly color varieties but does not state the distribution of these or give sufficient characterization to render them recognizable. Van Duzee, Canad. Entomol., XVIII, 1886, p. 209, writes: "I find on comparison with a lot of perhaps one hundred fully developed examples from Kansas, that ours [from N. E. United States] are quite uniformly larger and more robust, with longer hairs on the pronotum." I have been able to confirm Van Duzee in these conclusions and believe that these northeastern forms should be referred to *Blissus leucopterus* var. *hirtus* Mont.

Blissus leucopterus var. **hirtus** Mont.

Blissus hirtus Montd. Ann. Soc. Entomol. Belg., XXXVII, 405, 1893.

Described as a new species by Montandon, 1893, from a single specimen from Hazleton, Pa. This particular specimen is unusual in lacking the piceous spot at the apex of the corium, but the other characters are typical of the more robust eastern form which has longer, denser and more tawny villosity on the pronotum. The femoræ are also frequently castaneous. At most this can only be considered a variety particularly common to the highlands of northeastern United States and Canada, where it is found in both macropterous and brachypterous conditions.

Blissus leucopterus var. **arenarius** n. var. Longer and narrower than *B. leucopterus* Say, the abdomen being distinctly longer than head and thorax together. The antennæ have the first three segments and base of fourth ochraceous. The villosity of the pronotum is shorter, less dense and grayish. The hemielytra have the membranous areas more sordid white; the veins limiting the clavus and those of the posterior margin and other parts of the corium for the most part stramineous or faintly tinged with brown; the apical spot is not so strongly piceous, either stramineous, ferrugineous or slightly embrowned. Legs ochraceous. Only macropterous forms known to me.

Described from one ♂ (type) and two ♀'s collected by Dr. F. E. Lutz, of the American Museum of Natural History at Sandy Hook, N. J., June 30, and July 29, 1910. These were collected on a species of sand grass growing back of the sand dunes along the beach. One ♂, Coney Island, N. Y., Sept. 23, 1891, collected by the late Dr. J. L. Zabriskie (A. M. N. H.). One ♀ collected by me the beach at Rockaway, Long Island, May 25, 1912 (my coll.).

Blissus leucopterus var. **insularis** n. var. Shorter and narrower than the typical *B. leucopterus* Say. The antennæ much the same in character and color but the terminal segment is relatively shorter. The pronotum deep velvety-black, anteriorly prominently silver-gray; the villosity shorter and sparser. Hemielytra appearing more whitish through the fact that the veins are not straminous but concolorous with the whitish membranous areas; commissural margin of the clavus, apical margin of corium median vein apically and apical spot strongly piceous. Femoræ frequently castaneous.

This variety, judging from my material, inhabits the costal strip of Florida and there always brachypterous as stated by Schwarz, Proc. Ent. Soc. Washington, Vol. I, 1888, p. 105, that he never, among thousands of specimens, saw a single macropterous specimen. This variety also occurs in Porto Rico and doubtless other West Indian Islands, strange to say, in both the macropterous and brachpyterous forms.

Described from 3 ♂'s and 1 ♀, Punta Gorda, Fla., Nov. 16, 1911, and numerous examples from San Juan, Porto Rico, Aug. 2, 1914, which I collected by pulling up a wild grass growing closely appressed to the ground (A. M. N. H.). Type: a male from Fla. in the A. M. N. H.

PROCEEDINGS OF THE BROOKLYN ENTOMOLOGICAL SOCIETY.

Meeting of January 17, 1917.—Long Island records: *Corymbites triundulatus,* recorded from Rockaway by Mr. Ballou.

Under the head of "A New Collecting Ground for Insects on Long Island" Mr. W. T. Davis recorded from Selden and vicinity, a queen of *Polyerges rufescens lucidus* Mayer; *Dolichoderus mariæ* Forel, an inhabitant of sandy areas; and *Atta septentrionalis* McCook, the fungus-growing ant, previously reported from Smithtown and Wading River (see Bull. Brooklyn Ent. Soc., X, 81, October, 1915); *Cicindela rugifrons* Dej., the usual green form, a blue example and two dark olive; *C. purpurea, C. tranquebarica, C. punctulata,* and *C. generosa. Stratægus antæus* Fab., the ox-beetle, was found in some numbers on August 30 and 31, most of them dead, on their backs with legs outspread; this species being previously reported from Wading River and Riverhead, L. I. *Aphilanthops frigidus* was seen carrying a winged female ant, *Formica fusca* var. *subsericea* Say; at night, by lantern light, the beetle *Carabus limbatus* was seen running on a wood path with a small oak-gall in its jaws. Twenty-nine species of Orthoptera were collected. An interesting botanical find was two clumps of *Juniperus communis L.* near Selden, an addition to the known flora of Long Island. Mr. G. P. Engelhardt in his third communication on his trip to the Pacific coast recorded the finding of an ant, determined by Prof. W. M. Wheeler as *Camponotus maculatus* Fabr. subsp. *vicinus* Mayer emitting a phosphorescent light ventrally. Only one specimen was taken in the night.

Meeting of February 15.—Miss Louise Joutel and Mr. Rowland R. McElvare were elected members. Under Long Island records, Mr. W. T. Davis reported *Gortyna immanis,* Yaphank, Aug. 29, possibly new to the Island. Mr. R. P. Dow spoke on the blind cave beetles of Europe and showed 61 species. Mr. G. P. Engelhardt, continuing the narrative of his Pacific coast trip reported taking at Monterey, *Halisidota argentata, Grapta satyrus, Polyphilla decemlineata* and *Euryophthalmus* (*Largus*) *lunatus.* The lumps of pitch with empty pupa cases attached showed the abundance of the clear-winged moth *Vespamina sequoiæ.*

Meeting of March 15.—Mr. W. T. Bather commented on the vast numbers of *Adimonia* found on the fallen chips of the Sequoia.

Meeting of April 12.—Long Island records: Mr. W. T. Davis reported *Upis ceramboides* from Orient, taken by Roy Latham; Mr. W. T. Bather recorded for the first time from the Island *Euchoeca cretaceata* Pack. taken in his shrubbery at Brooklyn, on June 7, 1917. Mr. Notman spoke on collecting in the Adirondacks, July 25–28, above the timber line on Mt. Marcy, N. Y. Some of his captures were *Leptura tibialis, Bembidium oblongulum, Crepidodera robusta;* a specimen of the deer bot-fly, *Cephenomyia abdominalis* was taken, apparently wind-blown to the rocks, to one of which it clung. Mr. W. T. Davis, speaking on "Some Long Island Insect Records of Interest from Yaphank" mentioned among rarities the capture of a male and female *Canthon viridis* Beauv. rolling their manure ball by the side of a ditch on July 11; *Odontæus cornigerus* Melsh., a male on July 7; two females of *Prionus pocularis* Dalm. came to light. Since the great fire at Yaphank in May, 1911, many Tenebrionid beetles are to be found especially under the bark of dead trees. The following were here taken: *Nyctobates pennsylvanica* DeG., *Merinus lævis* Oliv., *Scotobates calcaratus* Fabr., *Xylopinus saperdioides* Oliv., *Xylopinus ænescens* Lec., *Tenebrio obscurus* Fabr., *Tenebrio castaneus* Knoch. and *Helops micans* Fabr. *Tolype laricis* was found by the side of a road on August 28; *Catocala tristis* Edw. (*andromeda* Gn.) was found on the trunk of a pine, the same species being taken in July, 1909, on a tree-trunk. In the latter part of August a number of cicadas were found dead along the roads. On August 28 as many as four *Tibicen canicularis* were so found, and on another occasion *Tibicen lyricen. Sphecius speciosus* was seen to seize a female *Tibicen canicularis* on a tree trunk, both falling directly to the ground.

Meeting of May 10.—The resignation of Mr. W. D. Kearfott was accepted with regret. Long Island records: Mr. W. T. Davis exhibited *Eros aurora* Hbst. from Yaphank, May 8, 1917, and reported it quite common there, about some dead pines, some under the loose bark and others crawling on the trunks of the trees; about 30 were collected by himself and Mr. Howard Notman. Mr. F. M. Schott reported the fly *Brachypalpus frontosus* from Massapequa. Under the scientific program, Dr. J. Bequaert showed a collection of Œstridæ he had made in the Belgian Congo and in Europe. Among those shown were the bot of the rhinoceros, elephant, certain deer and the cow. *Glossina palpalis,* which conveys the African sleeping sickness, was also shown.

Meeting of June 14.—The death of Mr. Charles E. Sleight, on May 20, was recorded. Long Island records: Mr. Ballou showed *Lebia bivittata; Anthophilax alternatus* was reported by Mr. Woodruff; Mr. Funaro reported *Elater sayi.* Mr. W. T. Davis showed specimens of *Thelydrias contractus* Motschulsky (*Ignotus ænigmaticus* Slosson) stating that he had a colony of this museum pest in a glass jar and that in May and June the beetles reached maturity in great numbers. He considered that the life cycle was probably one year, as stated by Mr. L. H. Joutel in Jour. N. Y. E. S. for September, 1911.

Meeting of October 11.—Mr. W. T. Bather reported *Vanessa milberti* from Orange County, N. Y., and others reported it from various places on Long Island. Mr. Shoemaker reported *Anthophilax viridis, alternatus* and *malachiticus* from Slide Mountain, Orange Co., N. Y., and *Gnorimus maculosus* taken at Wading River, L. I., by Mr. Nicolay. Mr. Bueno reported taking over a dozen *Ochterus banksi* and that *Pithanus maerkeli* was apparently well established at White Plains, N. Y. Mr. Engelhardt, for himself and Mr. Doll, exhibited among other things the main object of their quest in the west, four *Sphinx dolli.*

Meeting of November 15.—The death of Mr. W. D. Kearfott was reported to the Society.

Long Island records: Mr. Ehrhart reported *Thysania zenobia* from Woodside, on a tree trunk; Mr. Nicolay reported the fly *Leuchocnemis lituratus* Loew from Wading Rover.

Mr. Bueno described a new killing bottle made with carbon tetrachloride. Messrs. W. T. Davis showed *Enallagma traviatum* Selys, *Sympetrum costiferum* Hagen, *Somatochlora tenebrosa* Say, *Æschna clepsydra* Say, *Æschna umbrosa* Walk. and *Celithemis ornata* Ramb., the first two being additions to the local list, which now numbers 122 species in this order. All were taken at Wyandanch. Here he also took a female *Scudderia texensis* with the ovipositor inserted under the bark of a dead stem of *Rhus glabra.* In Hymenoptera he showed a *Mutilla* and the nest of a leaf-cutting bee found in a chamber in the ground on a dry hillside between Wyandanch and Pinelawn. The *Mutilla* was seen entering the hole and when dug up it was found in the bee's nest. Mr. Engelhardt, for Mr. Doll, showed the butterflies collected the past summer in southwestern Utah, among them being *Argynnis hesperis, A. behrensi, Melitæa nebigena, M. acastus, M. minuta, Phyciodes camillus, Ph. tharos* v. *morpheus, Vanessa californica, V. milberti, Pyrameis caryæ, P. cardui, Limenitis weidemeyeri, Cœnonympha ochracea, Satyrus paulus, S. silvestris* v. *charon, Thecla dryope, T. belenina, T. behrii, T. fotis, Chrysophanus helloides, Lycæna pheres, L. antiacis* v. *behrii, L. sagittigera, L. podarce, L. sæpiolus, L. rustica, L. melissa, L. acmon, L. marina, Pieris sisymbri, P. beckerii, P. oleracea, Anthocharis creusa, A. ausonides, A. thoosa, Colias keewaydin, C. alexandra, Papilio daunus* and *P. rutulus.*

A NEW SPECIES OF ORTHOCLADIUS (CHIRONOMIDÆ, DIPTERA).

By J. R. Malloch, Urbana, Ill.

The species described in this paper is the first of the genus which I have seen with conspicuously marked wings.

Orthocladius bifasciatus sp. n.—Female: Black. Head, with the exception of the eyes, and the thorax glossy; abdomen velvety. Legs whitish yellow, blackened on coxæ, femora except bases, apices of tibiæ and of tarsi. Wings with two broad black fasciæ, one before and the other just beyond middle, which are connected along costa by a fuscous streak, and more or less distinctly connected in middle between cubitus and media; subapical fascia narrowed posteriorly, not reaching margin of wing. Halteres black.

Antennæ fully as long as thorax, surface hairs short. Thorax almost nude, center with a slightly depressed line in which is a series of short hairs; scutellar hairs short and weak; pronotum very short, linear above, and without distinct central incision. Basal joint of fore tarsi not over two fifths as long as tibiæ; empodia distinct but small. Costa ending at beginning of apical curve of wing; upper branch of cubitus conspicuously undulated, ending closer to media than to lower branch of cubitus.

Length, 1.5 mm.

Type locality, Stratford, Ill., June 22, 1917 (J. R. Malloch).

ADDITIONAL DATA ON THE DISTRIBUTION AND FOOD PLANTS OF LYGUS WITH DESCRIPTIONS OF A NEW SPECIES AND VARIETY (HEMIP. MIRIDÆ).*

By Harry H. Knight, Ithaca, New York.

The writer has recently published a revision of the genus *Lygus*,† giving data on the distribution and food plants of the species in the United States. During the summer of 1917 it was the writer's good fortune to be a member of the Cornell Biological

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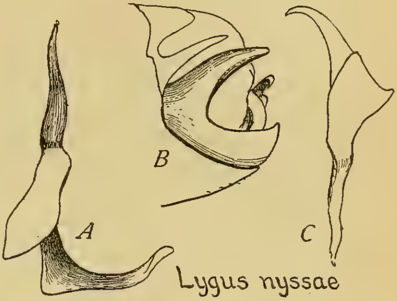
* Contribution from the Department of Entomology of Cornell University.

† Bull. Cornell Agr. Expt. Station, 1917, No. 391.

Expedition and while journeying through the southern states he obtained data on the food plants and distribution of species not given in the first paper.



Lygus nyssæ, genital claspers. *A,* left clasper, dorsal aspect; *B,* lateral aspect of left clasper and tip of venter; *C,* right clasper, ventral aspect.

Lygus (Neolygus) nyssæ new species.—Size and general structure similar to *quercalbæ;* pronotum and scutellum evenly shaded with rich brown, clavus and corium darker brown; male genital claspers distinctive of the species, most closely related to *laureæ.*

♂. Length 5.5 mm. *Head:* Width across eyes 1.14 mm., vertex .40 mm., length .45 mm., height at base .68 mm.; strongly vertical, smooth shining, carina arcuate and distinct; yellowish brown, eyes dark brown. *Rostrum:* Length 1.88 mm., only reaching to the posterior margin of the middle coxæ, yellowish, the apex fuscous.

Antennæ: Segment I, length .63 mm., yellowish; II, 1.91 mm., yellowish, slightly darker toward the apex; III, 1.00 mm., brownish, tinged with fuscous; IV, .48 mm., slightly darker than III.

Pronotum: Length 1.25 mm., width at base 2.18 mm., width at anterior angles 1.00 mm., collar .71 mm.; evenly shaded with rich yellowish brown; calli, punctuation and pubescence similar to *quercalbæ. Scutellum* same color as the pronotum, sometimes slightly darker toward the tip. *Sternum* yellowish; pleura and orifice yellowish brown.

Hemelytra: Greatest width 2.5 mm.; structurally similar to *quercalbæ* but with thicker yellowish pubescence; embolium and narrow margin of the adjoining corium pale yellowish; corium rich dark brown, clavus slightly darker than the corium; cuneus pale. *Membrane* evenly shaded with fuscous, pale bordering the cuneus, veins brownish.

Legs: Pale to yellowish, apices of the femora scarcely darker.

Venter: Yellowish, slightly darker on the sides and tip of the genital segment; genital claspers distinctive of the species, the left clasper dividing at the base, most closely related to *laureæ.*

♀. Length 5.6 mm., width 2.57 mm.; very similar to the male in size and coloration.

The specimens were all taken on sour gum (*Nyssa* sp.), which is the food plant of the species. This species is typical of the subgenus *Neolygus*,† which includes a large number of species found in the eastern states. It is the only species thus far described in the group that appears to be strictly southern in its distribution.

Holotypes: ♂, June 9, 1917, Auburn, Alabama (H. H. Knight); Cornell University Collection. *Allotype:* Taken with the type. *Paratypes:* 2 ♂, 2 ♀, taken with the types; ♂ June 12, LeRoy, Alabama (H. H. Knight).

Lygus tiliæ var. **heterophyllus** new variety.—Structurally not differing from *tiliæ* but uniformly pale green in color, membrane pale; males with the inner apical angles of the corium lightly infuscated, but never as dark as the typical female of *tiliæ;* females uniformly delicate pale green, might easily be confused with small pale forms of *apicalis* but distinguished by having a shorter rostrum.

Described from specimens taken on *Tilia heterophylla*, where the species was found breeding.

Holotype: ♂, June 16, Fla., Georgia (H. H. Knight); Cornell University Collection. *Allotype:* Taken with the type. *Paratypes:* 2 ♂, 12♀, taken with the types; ♀ April 3, Agricultural College, Mississippi (G. F. Arnold).

Lygus inconspicuus Knight.—3 ♂, 5 ♀, June 8, Stone Mountain, Georgia. These specimens were taken on wild grape-vine (*Vitis rotundifolia*), which is apparently the food plant of the species. *Paracalocoris multisignatus* Reuter was taken in company with this species on the same vine.

Lygus neglectus Knight.—2 ♂, 1 ♀, June 12, LeRoy, Alabama; ♂, June 12, Calvert, Alabama; 3 ♂, June 16, Colyell, Louisiana.

This species is apparently more frequent on *Carpinus caroliniana* along shady water courses of the southern states than is the case in the north.

Lygus geneseensis Knight.—6 ♂, June 2, Cochran, Virginia, taken on *Quercus alba*.

Lygus semivittatus Knight.—♂, June 9, Auburn, Alabama. Just this one isolated specimen was taken which extends the range of the species considerably south of the previously known distribution. The species was described from New York and a single specimen from Four Mile Run, Virginia, taken by Mr. W. L. McAtee.

Lygus olivaceus Reuter.—Several nymphs and adults June 14, Biloxi, Miss., taken on bayberry (*Myrica cerifera*). Many nymphs and adults taken June 15, Bay Saint Louis, Miss., on buttonbush (*Cephalanthus occidentalis*). 32 ♂♀, June 11, LeRoy, Alabama, taken on a shrub which was not determined. 10 ♂♀, June 18, Shriever, La. ♀ June 20, Mermentau, La.; many adults June 21, Orange, Texas, along the Sabine River; 4 ♂♀, June 21, Beaumont, Texas; all swept from *Cephalanthus occidentalis.*

It is apparent that the species may breed on several plants, but *Cephalanthus* appears to be the most frequent food plant in the Gulf states. The species was described from specimens taken in Jamaica by Mr. Van Duzee and by the fact that *Cephalanthus occidentalis* is known from the West Indies it may well account for the distribution of the species. Through the study of the extensive material collected by the writer during 1917 he is quite convinced that *olivaceus* Reuter (1907) is but a form of *fasciatus* Reuter (1876), and should be regarded as a variety of that species. The species varies considerably in size and coloration, which is to be expected of a form having such a wide distribution and several food plants.

Lygus apicalis Fieber.—The writer took a large series of nymphs and adults on horseweed (*Erigeron canadensis*), June 24, at Wharton, Texas. This food plant is a common weed now widely distributed over the world and this may account in a measure for the wide distribution of *apicalis.* The writer had taken the species on other occasions and always among weeds but never before found it numerous enough to locate the food plant.

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BULLETIN
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Vol. XIII June, 1918 No. 7

A PHYLOGENETIC STUDY OF THE TERMINAL ABDOMINAL STRUCTURES AND GENITALIA OF MALE APTERYGOTA, EPHEMERIDS, ODONATA, PLECOPTERA, NEUROPTERA, ORTHOPTERA, AND THEIR ALLIES.*

By G. C. Crampton, Ph.D.

The insects here discussed are the Protura, Sminthurids, Japygids, Machilids, Lepismids, Ephemerids, Neuroptera, Odonata, Plecoptera, Embiids, Dermaptera, Zoraptera, Isoptera, Blattids, Mantids, Phasmids, Orthoptera, and their immediate relatives. A more detailed description of the modifications of the genitalia occurring in these different groups will be taken up in subsequent articles dealing with the subject; so that the present paper is intended merely to serve as the basis of the later more detailed discussion of the genitalia of these groups, and of the higher orders of insects. The present paper is also offered as one of a series of articles dealing with the structures which appear to be of the most value for a phylogenetic study of the orders of insects. The other papers of this phylogenetic series were published in the Can. Ent. for June, 1917; in the Nov., 1917, issue of the Ent. News; in the Dec. number of the Jour. N. Y. Ent. Society for 1917; in Psyche for February, 1918, and in the Proc. Ent. Soc. Washington for 1918.

Since I have been dependent upon the generosity of others for practically all of the material studied in the preparation of the present paper, I would make use of this opportunity of acknowledging my indebtedness and expressing my very deep gratitude to Mr. A. N. Caudell for specimens, identifications and literature in Orthoptera; to Dr. P. P. Calvert, and Mr. E. B. Williamson for material, identifications, and literature in Odonata; to Dr. L. O. Howard, Dr. A. D. Imms, and Mr. R. May for Embid material; to Dr. W. M. Wheeler and Mr. Ferris for Isoptera and a male of *Timema;* to Mr. C. C. Gowdey and Dr. K. Jordan for Dermapteron material; to Mr. Graveley for specimens of *Humbertiella;* to Prof. R. A. Cooley for specimens of *Peranabrus;* to Dr. N. Banks for literature from his private library; and to Mr. J. A. G. Rehn, Dr. A. Morgan and Dr. N. Banks for identifications of Blattids, Ephemerids and Plecoptera.

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* Contribution from the Entomological Laboratory of the Massachusetts Agricultural College, Amherst, Mass.

Those terminal abdominal structures which, from their widespread occurrence throughout the groups of insects here discussed, have proved to be of the most importance for a phylogenetic study are the pygidium or epiproct, the paraproct, the cerci, the phallus with the titillator, and the hypandrium with the styli. The term pygidium or *epiproct* refers to the tergal region of the eleventh abdominal segment or its homolog labeled *"sa"* in the various figures, and is a synonym of the designations supraanal plate, suranale, and median inferior appendage (of Anisoptera). The term *paraproct* refers to the regions homologous with the lateral portions of the eleventh abdominal segment, labeled *"pa"* in the various figures, and is a synonym of the terms parapodial plate, subanal plate, subcercus and the paired inferior appendages (of Zygoptera). The terms epiproct and paraproct (*i. e.,* epiproctus and paraproctus) have been used in place of the more cumbersome English designations supraanal plate and parapodial plate, for the sake of brevity, and at the same time to emphasize their position with regard to the anal opening, which is one of the landmarks used in identifying these structures in the different groups of insects. The term *hypandrium* or hypoproct refers to the ventral portion of the tenth abdominal segment or its homolog labeled *"hy"* in the different figures. This structure is also designated as the subanal plate, lamina subgenitalis or subgenital plate; but the true subgenital plate, or subgenitale, is the ventral portion of the eighth abdominal segment of female insects, and is therefore somewhat different from the hypandrium of the males. The designations *cerci* and *styli* (" c " and " s " of all figures) need no explanation. I have used the term *phallus* for the true penis " pe " of the different figures, since the designation " penis " has been applied to all manner of structures, such as the accessory organs at the base of the abdomen in male Odonata, etc., and it would create confusion to apply the term penis to the phallus in such cases. The *titillator* is the structure labeled " ep " immediately above the phallus, and is sometimes referred to as the epiphallus.

The phallus is an extremely variable structure even within the same group of insects, and the difference between the phallus of certain species of the same genus of *Diptera,* for example, is so great that it is almost impossible to homologize the parts, so that in many instances, it is advisable to make merely a tentative homologization of the various portions of the phallus, leaving the definite determination of the parts until more intermediate forms are available for comparison.

In certain Apterygota such as the Sminthurids (Fig. 88) and the Japygids (Fig. 87) the phallus *" p "* is little more than a pappilla, presenting no features of especial interest for a study of the parts in winged insects. In the Protura (Fig. 86), on the other hand, the phallus is bipartite, that portion here figured being composed of a pair of median structures " eu " through which the ejaculatory ducts empty, and a pair of so-called parameres " pr." Traces of such a bipartite phallus are retained in the partially divided organ " pe " of the Lepismoid insect *Nicoletia* (Fig. 95), while in the Lepismid shown in Fig. 94, the two parts of the phallus " pe " are quite closely united. For the sake of brevity, I would use the designation " diphallic " to refer to the type of phallus made up of two parts, and " monophallic " to refer to the forms in which the parts of the phallus have united to form a single organ, or in which one of the halves of the phallus has been lost.

Among the Pterygotan insects, the Ephemerids (Figs. 4, 5, 9, and 15) have retained the diphallic condition in most instances. Some Plecoptera (Fig. 16, " pe ") have retained the diphallic condition, but most of the specimens studied were monophallic (Figs. 14, 17, etc., " pe "). The more primitive Dermaptera such as *Echinosoma* (Fig. 24, " pe ") are diphallic, while the higher earwigs such as *Forficula* (Fig. 25, "pe") might be termed monophallic, although traces of the original diphallic condition are retained in many cases. I have been much disappointed to find that in my material, the phallus of the Ephemerids is not very like that of the Odonata, nor does the phallus of either of them resemble that of the Neuroptera very much. The phallus of the Ephemerid shown in Fig. 9, "pe," is somewhat like that of the Plecopteron shown in Fig. 16, "pe," and there is some slight resemblance in both to the phallus of the primitive Dermaptera (Fig. 24, "pe"); but the similarity is not very striking.

The phallus of the Isoptera available for study (Figs. 39 and 40, "pe") is not well developed, which is rather surprising from the fact that the Isoptera exhibit other close resemblances to the Blattids and Mantids in which groups the phallus is well developed. The phallus of most Blattids (Figs. 77 and 92, "pe") and Mantids (Figs. 70 and 71, "pe") is strongly asymmetrical, and the structure of the phallus is essentially the same in both groups, which might be expected from the rather close relationship indicated by other structures.

The phallus of the Phasmids (Figs. 51, 52, 54, etc., "pe") is quite highly modified, even in such primitive forms as *Timema* (Figs. 42 and 65), and is disappointingly unlike that of the lower Gryllids, Tettigonids, and Locustids, to which the Phasmids are undoubtedly closely related. The phallus of certain Tettigonids (*i. e.*, "Locustids") such as *Peranabrus* and *Stenopelmatus* (Figs. 45 and 46) is faintly suggestive of the condition found in the Blattids and Mantids, but in the saltatorial groups, the phallus is apparently more symmetrical, and the parts are more closely united. Some Blattids (Fig. 82) are "aphallic," or the greater portion of the phallus is either rudimentary or is united with the surrounding regions to such an extent as to be practically undiscernible. In most Mantids, however, the phallus is well developed.

It is an extremely difficult matter to interpret the parts of the phallus in all of the insects here figured, so that many of the homologies here given are purely tentative, subject to subsequent modifications based upon a further study of intermediate forms not at present available. In the most primitive insects such as

Eosentomon (Fig. 86) the terminal portion of the phallus is composed of a pair of inner structures, the *eupenes* "eu," and a pair of outer parts, the so-called *parameres* "pr." The ejaculatory ducts empty through the *virga* "va" at the end of the eupenes "eu" in *Eosentomon* (Fig. 86), so that these structures are doubtless homologous with the parts labelled "eu" and "va" in the primitive Dermaptera (Fig. 28). The so-called parameres "pr" of *Eosentomon* (Fig. 86) are doubtless homologous with the parameres "pr" of the Dermaptera (Fig. 28); but there is some question in my mind whether the structures usually termed parameres in *Nicoletia* (Fig. 95, "pr") are entirely homologous with the parameres of the other insects mentioned above. The cleft phallus "pe" of *Nicoletia* (Fig. 95), however, is apparently homologous with the inner pair of structures "eu" of the phallus of *Eosentomon* (Fig. 86), as is also true of the two structures labeled "pe," in the Ephemerid shown in Fig. 5, since the ejaculatory ducts open through these structures.

I am not certain that the structure labeled "va" in the Plecopteron shown in Fig. 14 is the "virga" of the primitive Dermaptera (*i. e.*, "va" of Fig. 28) which is the chitinized terminal portion of the ejaculatory duct; and there is a possibility that the structures called postunci (or penis hooks) of the roach shown in Fig. 96, "pn," may correspond to the virga "va" of Fig. 28 although the ejaculatory duct does not appear to open through them; but until suitable material for determining this point is available, I have retained the separate designation postunci for the structures in the roach, etc.

In the roaches and Mantids (Figs. 83, 91, 67, 68, and 77; and Figs. 70, 71, 75, 78 and 79) it is extremely difficult to determine which structures are the typical parts of the phallus of the primitive insects, so that it has seemed preferable to apply distinct terms to the parts of the insects in question, until their homologies can be more definitely determined. In these roaches and Mantids, there are two asymmetrically arranged lower lobes or sublaminæ "sl" which may or may not be provided with terminal penis-hooks or postunci "pn." There is a possibility that these lower lobes may represent the pair of inner structures "eu" of Figs. 28, 86, etc., or the two lobes labeled "pe" in Fig. 5.

In addition to the lower lobes "sl," a lateral lamina "pl" occurs in many Mantids and Blattids (Figs. 83, 91, 75, 78, etc.), and in such roaches as *Periplaneta* (Figs. 67 and 68) the sinistral sublamina is apparently divided into the two structures labeled "pn" (sometimes referred to as the titillator) and "ju." In the latter roach, two other processes "pu" and "f" (Figs. 67 and 68) occur. The structure labeled "f" is a plate bordered by a fringe of flat spines, and appears to be a portion of the lateral lamina "pl"; while the process "pu," which has been called the "penis" by some investigators, is more intimately associated with the parts employed in copulation, and is also represented in the roach shown in Fig. 83, "pu," etc. There is a possibility that the process "pu" of Figs. 67, 68, 83, etc., may be the homologue of the parameres "pr" of the phallus of the more primitive insects (Figs. 28, 86, etc.) or even of the parts "eu"; but this point cannot be determined from the material at present available.

The phallus of the saltatorial Orthoptera (Figs. 45, 57, 66 and 69) has two lower lobes "sl," which are probably homologous with the lower lobes of the Blattid and Mantid phallus (Figs. 75, 78, 83, and 91, "sl"). Within the phallus of a tree-cricket, for example (Fig. 72), there are two processes forming the "endophallus" labeled "en," lying directly below the roof of the phallus "tm." Above the phallus of the tree-cricket is the titillator "ep" of Figs. 66, 69, 72, 73, and 74. The titillator has been referred to as the epiphallus by some investigators. In the tree-cricket (Figs. 66 and 73) there are two partially united hooks, or "epihamuli" projecting posteriorly from the titillator, and in the "Locustid" shown in Fig. 76, these "epihamuli" project backward as two distinct hooks labeled "ep." The small processes designated by the label "ep" in Fig. 45 are doubtless homologous with the "epihamuli." In the "Locustid" shown in Fig. 60, there are two callosities bearing small spines, designated by the label "ec," which are associated with the titillator, but are not strictly homologous with the hooks. These callosities, termed epicalli, are possibly homologous with the processes labeled "ep" in the grasshopper shown in Fig. 64, though these processes may be homologous with the hooks of the titillator rather than with the callosities. These features appear to be characters of considerable importance from the systematic standpoint; but they have not been used very much in keys, due, no doubt, to the fact that they are not easily seen from without.

The homologies of the titillator are not easily determined. Some investigators would compare this structure to the parameres of lower forms. In the Neuroptera such as the one shown in Fig. 100, I think that the structure "ep," usually termed the "penis," is really the titillator. The columna labeled "co" in Fig. 100 may possibly be the homologue of the structure designated by the label "pe" in the Plecopteron shown in Fig. 17. I have not the necessary intermediate forms, however, to determine these and other points of interest, and the lack of this material has proved to be a great handicap in the present study of the phallus. I would therefore greatly appreciate the loan of any material which anyone might deem suitable for this purpose, since my own collection is too meagre to permit of an extended study of intermediate forms necessary to determine many of the points in question.

In certain Blattids, such as those shown in Figs. 97 and 99, there occur two prong-like processes labeled "sh," which appear to be portions of the paraproct "pa." One of these prongs in the roach shown in Fig. 99, "sh," projects downward into the region of the phallus, while the other prong (the one located on the sinistral side of the body) has become reduced in size, and is more closely united with the paraproct region "pa." In the roach shown in Figs. 80 and 81, the sinistral prong has disappeared, while the dextral one "sh" of Fig. 81 is closely united with the paraproctal region "pa" of Fig. 80.

Since the structure called the vomer "v" in certain Phasmids (Figs. 51 and 62) is rather closely associated with the paraproctal region "pa," this suggests the possibility that the vomer "v" (Fig. 51) may represent the united prongs "sh" of the roach (Fig. 97). The prongs of the titillator (Figs. 73 and 76 "ep") are usually located at quite a distance from the paraproct region ("pa" of Fig. 73), although their location above the phallus is rather suggestive of that of the prongs "sh" of the roach (Figs. 97 and 99). Pantel, 1915, very strongly opposes the idea that the vomer "v" (Fig. 51) of the Phasmids is homologous with the titillator "ep" of the Orthoptera (Figs. 64 and 76), although Brunner von Wattenwyl and Redtenbacher, 1908, regard the titillator and vomer as identical.

Posterior to the phallus "pe" of certain Phasmids (Fig. 52) is a small sternal plate or poststernite "ps." From its position immediately posterior to the phallus "pe" it would appear that the sternal plate "ps" of the Odonata (Figs. 1 and 2) is homologous with the poststernite "ps" of the Phasmids (Fig. 52). Indeed, there is something very suggestive of Odonatan affinities in the general structure of a Phasmid, and it is quite possible that the Odonata were rather closely related to the ancestors of the Phasmids.

Closely associated with the cerci "c" are the paraproctal plates or *paraprocts* "pa," situated on either side of the anal opening (Figs. 1, 2, 3, 13, 18, 24, 37, 39, 52, 57, 65, 97, 71, 94, etc.). These have been termed the subcerci and the subanal plates. They are not always situated under the anal opening, however, and in some insects such as the Plecopteron shown in Fig. 13, "pa," they may even project above the anal opening, so that the term paraproct (paraproctos) is more appropriate and briefer than the designation subanal plate. In certain Plecoptera (Fig. 10) the paraprocts "pa" are closely applied to the posterior process "po" of the sternal plate, while in other Plecoptera (Fig. 16) the paraprocts project free and bear rather oddly shaped hooks—as is also the case in the Plecopteron shown in Fig. 13. In some Plecoptera resembling the one shown in Fig. 17, I have observed what appear to be gills attached to the paraprocts "pa." The projections, etc., of the paraproct region should not be confused with the bicornua or posterior paired horn-like projections of the tergal region in certain Plecoptera (Figs. 12 and 16, "b") which resemble them quite closely, but are situated much higher in the tergal region.

In the Ephemerids (Figs. 9 and 15) the paraprocts "pa" are rather closely associated with the median terminal plate "sa"; but I imagine that in the more primitive Ephemerids the paraprocts are larger and more distinctly separated. In such Odonata as *Lestes* (Fig. 1) the paraprocts "pa" are elongate, and in some of the Odonata they are even more developed and resemble such elongate paraprocts as those of the Phasmids (Figs. 65 and 52, "pa"). In other Odonata, the paraprocts "pa" (Figs. 2 and 6) are reduced to short appendages, which in some forms, such as those shown in Figs. 7 and 8, "pa," bear projections of various shapes; and frequently ventral membranous areas, or calli, and pappillæ occur on them.

The paraprocts of the Dermaptera (Fig. 24) are usually represented by the region which bears the label "pa" in this figure; but the lobes mesalward to the parameres "pr" in Fig. 24 are continuous with the surface of the paraprocts "pa," and should be regarded as parts of the paraprocts. In such Dermaptera as *Arixenia* (Fig. 21) the paraprocts "pa" are more like those of the Isoptera, Orthoptera, etc., while the paraprocts of the other Dermaptera studied are more like those of certain Plecoptera.

The paraprocts of the male Embiids are not easily made out, due to the reduction of this region, and the strong asymmetry of the parts of the male. Despite the fact that the Embiid shown in Figs. 37 and 38 had moderately well-developed wings, I think that it is probably a female rather than a male. Its paraprocts "pa" (Figs. 37 and 38) are quite like those of the Isoptera (Figs. 39 and 40, "pa"), which is rather surprising, since the Embiids show other undoubted resemblances to the Plecoptera, to which they are apparently more closely related than to any other insects.

The paraprocts of the Mantids (Fig. 71, "pa") are rather like those of the Blattids (Fig. 77, "pa"), while those of the Orthoptera (Figs. 61 and 63, "pa") resemble the paraprocts "pa" of the Isoptera (Figs. 39 and 40) to some extent, although they also resemble the paraprocts of the Mantids and Blattids, as may be seen by comparing Fig. 63 with Fig. 92. In such Phasmids as *Timema* (Figs. 65 and 42), on the other hand, the paraprocts "pa" are rather suggestive of those of the Plecoptera. The paraprocts "pa" of the Lepismids (Fig. 94) are also somewhat like those of certain Plecoptera.

In the Neuroptera (Fig. 100) there occur on either side of the anal papilla "ap," two plates labeled "pa," which bear processes called the "gonopoda" by systematists. In such Neuroptera as *Corydalis,* the male bears an upper pair of appendages and a lower pair, both of which articulate with the region "pa." These appendages have been homologized with abdominal limbs by some investigators, although their true homologies have not been definitely determined. In such Mecoptera as the males of *Merope tuber,* there occur segmented structures which have been homologized with these so-called gonopods of *Corydalis* and the other Neuroptera. Since true cerci have been described by Tillyard, 1917, as occurring in the male of the Mecopteron *Nannochorista* in addition to the gonopods, these gonopods are evidently not the cerci. In certain Ephemerids (Fig. 9) there occur jointed styli, labeled "s," which have been homologized with these gonopods of the Neuroptera and Mecoptera; but the styli "s" of Fig. 9 typically occur on the ventral plate "hy" (which is homologous with the ventral plate "hy" of Fig. 100) so that the appendages of the plate labeled "pa" (*i. e.,* the gonopodia) in Fig. 100, can hardly be homologized with appendages of plate "hy" of Fig. 100, since one plate is dorsally located, and the other is ventral. On this account, I do not think that the styli of the Ephemerids (Fig. 9, "s") are homologous with appendages of plate "pa" of Fig. 100, and they therefore are not to be homologized with the gonopods of Neuroptera. Plate "pa" of Fig. 100, however, appears to be homologous with the paraprocts of other insects ("pa" of other figures) and has been provisionally designated as the paraproct of the Neuroptera, in the present paper.

The eleventh abdominal tergite "sa" of the Lepismid shown in Fig. 94 bears a median terminal filament or "telofilum," labeled "t," which is retained in certain Ephemerids (Figs. 9 and 15, "t") but appears to be wanting in most winged insects. The plate "sa" has been variously termed the supraanal plate, suranal plate, suranale, etc.; but has been here referred to as simply the epiproct or pygidium. In some Plecoptera such as those shown in Figs. 16, 18, etc., the epiproct "sa" bears a posterior horn-like projection labeled "pc." In certain Odonata (Figs. 7 and 8) the segment preceding the epiproct bears a horn-like process, not strictly homologous with the structure designated by the label "pc" in Figs. 16, 18, etc., but it is unnecessary to apply different terms to the two structures, which are practically the same in their nature and position on the tergal region of the segment bearing them.

In such Odonata as *Æschna* (Fig. 2) the epiproct "sa" is large, and is usually termed the "inferior" appendage, due to the fact that it is frequently bent downward between the cerci "c," although it represents the tergal region of the eleventh segment. In the dragonfly *Gomphus,* shown in Fig. 85, the epiproct "sa" is very broad, and bears on its lower surface a "subpapilla" labeled "d," which may possibly represent the remains of the twelfth tergite. In most Anisoptera the epiproct is quite large, while in most damselflies, the epiproct is greatly reduced or wanting, although the structure labeled "sa" in the damselfly shown in Fig. 6 appears to be homologous with the epiproct "sa" of the dragonfly shown in Fig. 2.

In the male Embiids (Figs. 32, 43, and 90) the terminal abdominal tergite is divided into two asymmetrical halves labeled "h." The Embiid shown in Figs. 37 and 38, however, has an undivided terminal tergite like the females of other Embiids, so that I am inclined to believe that the Embiid depicted in Figs. 37 and 38 is a female despite the presence in it of developing wings (which are usually borne by the males alone in the Embiids).

The fact that in the Zoraptera (Fig. 36) the terminal segments are markedly asymmetrical and the fact that their cerci "c" are also composed of two segments, as is the case with the Embiids (Figs. 32 and 34, "c"), might be taken as indicating a relationship to the Embiids. In general, however, the Zoraptera appear to be more like Isoptera.

In the Phasmid shown in Fig. 62, the tergite labeled "sa" is probably not the true epiproct or pygidium; but in the Phasmid *Timema* (Figs. 42, 53, and 65) the true epiproct, or eleventh tergite is represented by the projecting plate "sa" best seen in profile in Fig. 42. The Dermapteron shown in Fig. 26 has a similar projecting epiproct or pygidium labeled "sa"; but in most Dermaptera the epiproct "sa" does not project markedly backward (*e. g.,* Figs. 21 and 24).

In some roaches, such as that shown in Fig. 77, the epiproct pygidium or supraanal plate "sa" is large, and is emarginate posteriorly. In others it is smaller and more pointed posteriorly, as in Fig. 92, "sa"; the roach shown in this figure being more like *Stenopelmatus* (Fig. 63, "sa") or the Isoptera (Fig. 40, "sa") in this respect.

The epiproct "sa," paraproct "pa," and cerci "c" of a female Grylloblattid (Fig. 93) are not particularly like those of the Blattids here figured, although they are somewhat like those of the Mantids shown in Fig. 71. Dr. E. M. Walker is making a study of the genitalia of the male of a specimen of *Grylloblatta* exhibited by Dr. C. G. Hewitt at the Philadelphia "meetings," and it will be extremely interesting to learn the results of his studies on this insect (which is one of the most important living representatives of the lower groups, from the standpoint of phylogeny) since it furnishes us with the real key to the ancestry of the Orthoptera. I have thought from the anatomy of the female (Crampton, 1917) that *Grylloblatta* is intermediate between the Mantids and Embiids; but the study of the male will doubtless throw much more light upon the subject, and until Dr. Walker's investigations are available, the final decision as to the ultimate relationships of *Grylloblatta* must be regarded as undetermined, although there can be no doubt as to its affinities with the Orthoptera, and Phasmids.

The "terminalia" (*i. e.,* terminal segments and appendages—such as the epiproct, paraproct, cerci, etc.) of the Orthopteron shown in Fig. 56 are rather interesting from the fact that the epiproct bears a bifid posterior process labeled "pc," and below it is another posterior process "sc." Between the two is a vertical pocket containing a small sclerite whose shaded margin is partially visible in the figure.

The two posterior horn-like processes "b" of the Plecoptera (Figs. 16, 17, 12, etc.) have already been referred to. These "bicornua" are short in the Plecopteron shown in Fig. 16, "b"; while in Fig. 17, they are much longer and curve mesalward. In Fig. 12 they are prolonged far forward and their tips are overlapped by a "hummock-like" fold of the integument or "epiplica." Between the horn-like processes are tergal "sensomaculæ" (Figs. 10, 17, etc., "sm") or sense areas; and "sternomaculæ" or ventral sense areas (Fig. 13, etc., "su") occur along the median line of the sterna of certain of the abdominal segments. These areas should be of some value in systematic work, as is true of the various horns and protuberances mentioned.

The cerci ("c" of all figures) are extremely variable structures, being many-segmented in some insects, while in others they are composed of a pair of unsegmented appendages. Heymons and his followers do not apply the term cerci to the structures labeled "c" in the Odonata shown in Figs. 1, 2, etc., since they do not believe that these structures represent the transformed cerci of the early stages of Odonatan development. Handlirsch, on the other hand, maintains that these structures are re-formations of true cerci. The reasons for accepting the interpretations here given (based upon the location, relation to other landmarks, etc.) to the various Odonatan structures will be discussed in a subsequent paper. The cerci of certain Odonata (*e. g.*, Fig. 1, "c") bear mesal "teeth" and similar processes very suggestive of the condition occurring in the cerci of Phasmids and Orthopteroid forms, although the Phasmid shown in Fig. 65 is the only one here given which would illustrate this condition in the walking sticks. The cerci of many damselflies (Figs. 7 and 8, "c") are much reduced, and in some Odonata they bear projecting spines (Fig. 7, "c"), while in others they bear ventral membranous areas resembling "callosities" (Fig. 11, "c").

The cerci of the Ephemerids (Figs. 15 and 9) resemble those of the Lepismids (Fig. 94, "c") as do those of many Plecoptera (Fig. 14, "c"). The cerci "c" of the Orthopteron shown in Fig. 63 resemble those of the Blattid shown in Fig. 92; but the cerci "c" of the female of *Grylloblatta* (Fig. 93, "c") are more like those of certain Plecoptera, although they are not unlike the cerci of certain Mantids. The cerci of the Dermaptera are suggestive of those of the Phasmids and Odonata, but certain nymphal Dermaptera (*e. g., "Dyscritina" longisetosa, Diplatys,* etc.) have many-segmented cerci similar to those of some Plecoptera. Most of them, however, have cerci composed of but one segment as in saltatorial Orthoptera—although in some of the leaping Orthoptera, as that shown in Fig. 48, the cerci "c" are two-segmented, and I find traces of a similar condition in certain Tettigidæ. The cerci of certain Phasmids and Dermaptera are asymmetrical, as is true of the cerci of male Embiids. The cerci of the latter insects are two-segmented, as in the Zoraptera; but the cerci of the Zoraptera are more like the two-segmented cerci of certain Isoptera (Fig. 44, "c") in regard to the relative size of the component segments.

The ventral portion of the tenth abdominal sternum or its homolog which is prolonged posteriorly beneath the genitalia forms the hypandrium or hypoproct "hy" of all figures. This plate is sometimes termed the subgenital valve, subgenital plate, subanal plate, etc., but the true subgenital plate is the eighth ventral segment prolonged below the ovipositor of the female, and is so used in papers on the genitalia of female insects (Crampton, 1917), so that I prefer to designate the plate labeled "hy" in all figures as the hypandrium. A posterior prolongation of this plate forms a "prow" or "stern" in some insects (Figs. 10, 16, 60, 64, etc., "po"), and is of some value in classification.

The plate "hy" of winged insects is possibly made up, in part, of the united structures labeled "hy" in the Lepismid shown in Fig. 94, which are supposed to represent the basal portions ("coxæ") of the abdominal legs united with the sternum. Traces of the two structures "hy" of Fig. 94 may possibly be indicated by the lateral regions labeled "hy" in the roach shown in Fig. 92. The outline of the hypandrium is a feature of considerable importance in the classification of the Blattids.

The hypandrium "hy" bears a pair of segmented styli or arthrostyles labeled "s" in Fig. 9 of an Ephemerid. These segmented styli are called "gonopods" by some students of the Ephemerida, and in some saw-fly larvæ they have been referred to as "cerci." A comparative anatomical study, however, would indicate that the structures in question are merely segmented styli (or arthrostyles) which are composed of several segments in certain lower forms; but are one-segmented in most insects in which they are retained, and even in some of the Ephemerids, such as the one shown in Fig. 4, these styli "s" are composed of but one segment.

The styli are present in many male Blattids, being of considerable length in such forms as *Periplaneta* (Fig. 77, "s"), while they are quite rudimentary in such forms as *Baltella* (Fig. 96, "s") in which it is very difficult to make them out. In the latter roach, the plate "hy" is quite asymmetrical, and the styli "s" are unequally developed.

The styli "s" are quite well developed in certain male Mantids (Figs. 70 and 71), and are fairly large in some Orthoptera (Fig. 76, "s"), while in others (Fig. 60, "s"), they are greatly reduced or wanting. The styli of male Isoptera (Figs. 39, 40, and 44, "s") are usually small and inconspicuous. I do not find the styli represented in my Odonatan material (males), nor have I been able to find them in the Phasmids, Dermaptera, Embiids, or Plecoptera.

Since the foregoing discussion is intended merely to form the foundation of a subsequent more extended consideration of the terminal abdominal structures of the males in the different groups of insects, a detailed comparison of the modifications met with in these different groups can be more profitably taken up in separate papers dealing with them in particular. The second paper of the series of studies of male genitalia will shortly be published in Psyche, in which the modifications met with in the phylogenetically important group Neuroptera (which has been barely mentioned here) will be taken up in connection with a phylogenetic study of the parts in the Neuroptera, Mecoptera, Diptera, Trichoptera, etc.

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ABBREVIATIONS.

a, Subappendicula.
ap, Anopapilla.
b, Bicornua.
c, Cercus, or its point of attachment.
cc, Copulocallus (area for holding during copulation).
co, Columna.
d. Subpapilla.
pg, Phalliger.
pl, Paralamina.
pn, Postuncus.
po, Puppis or prora.
pr, Parameres.
ps, Poststernite.
pu, Peniuncus.
s, Stylus (segmented styli are arthrostyli).

ec, Epicallus.
en, Endophallus.
ep, Titillator, epihamulus.
eu, Eupenis or praeputium.
f, Fimbrilobus.
g, Glans of penis.
h, Hemitergite.
hy, Hypandrium or hypoproct.
ju, Juxtuncus.
ml, Membranous lobes below phallus.
p, Genital papilla.
pa, Paraproct.
ps, Postcornus.
pe, Phallus or true penis.
sa, Epiproct, pygidium, or supraanal plate.*
sc, Subcornus.
sh, suprahamus.
sl, Sublamina.
sm, Sensomacula.
sp, Spermatophore.
ss. Subsacculus.
su, Sternomacula.
t, Telofilum, or terminal filament.
te, Telson.
tm, Tectum.
v, Vomer.
va, Virga.

EXPLANATION OF FIGURES.

In all lateral views, excepting Fig. 100, the anterior end is turned toward the left hand margin of the page, and the dorsal surface is uppermost. In all dorsal or ventral views, the anterior end is directed toward the top of the page. Unless otherwise stated, figures are of terminal segments of male insects.

Plate II.

Fig. 1. Ventral view of Odonatan *Lestes rectangularis* Say.
Fig. 2. Ventral view of Odonatan *Aeschna mixta* Latreille.
Fig. 3. Lateral view of Odonatan *Calopteryx splendens* Harris.
Fig. 4. Ventral view of Ephemerid *Blasturus cupidus*.
Fig. 5. Ventral view of Ephemerid *Heptagenia* sp. (subimago).
Fig. 6. Dorsal view of Odonatan *Argia violacea* Hagen.
Fig. 7. Lateral view of Odonatan *Anomalagrion hastatum* Say.
Fig. 8. Lateral view of Odonatan *Ischnura posita* Hagen.
Fig. 9. Lateral view of Ephemerid *Heptagenia interpunctata*.
Fig. 10. Lateral view of Plecopteron *Leuctra* sp.
Fig. 11. Mesal view of cercus and paraproct of Odonatan *Enallagma civile* Hagen.
Fig. 12. Dorsal view of Plecopteron *Perla americana*.
Fig. 13. Caudal view of Plecopteron *Acroneura lycorias*.
Fig. 14. Lateral view of Plecopteron *Perlesta placida*.
Fig. 15. Lateral view of Ephemerid *Ephemera varians*.
Fig. 16. Caudal view of Plecopteron *Nemoura completa*.
Fig. 17. Dorsal view of Plecopteron *Acroneuria brevipennis*.

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* In Fig. 22, the label "sa" refers to the plate bearing the structure labeled "pc." In Figs. 63, and 92, the tergite labeled "sa" may not be the eleventh tergite, but is homodynamous with it. The subanal and supraanal plates of other insects are not the subanal and supraanal *laminæ* of Odonata.

Plate III.

Fig. 18. Caudal view of Plecopteron *Pteronarcella regularis.*

Fig. 19. Dorsal view of phallus of Dermapteron *Hemimerus talpoides* Walk., based on figure by Jordan, 1909.

Fig. 20. Dorsal view of phallus of Dermapteron *Echinosoma occidentale* Bormans.

Fig. 21. Lateral view of Dermapteron *Arixenia esau* (?) Jordan.

Fig. 22. Lateral view of Plecopteron *Capnia necydaloides.*

Fig. 23. Ventral view of Dermapteron *Hemimerus talpoides* Walk., strenum and phallus removed. Based on figure by Verhoeff, 1903.

Fig. 24. Ventral view of Dermapteron *Echinosoma occidentale* Bormans.

Fig. 25. Dorsal view of phallus of Dermapteron *Forficula auricularia.*

Fig. 26. Dorsal view of Dermapteron *Parasparatta dentifera* Rehn., after Hebard, 1917.

Fig. 27. Ventral view of phallus of Dermapteron *Hemimerus talpoides* Walk., based on figure by Jordan, 1909.

Fig. 28. Dorsal view of phallus of Dermapteron *Anisolabis maritima.*

Fig. 29. Ventral view of Dermapteron *Hemimerus talpoides* Walk., after Hansen 1894.

Fig. 30. Dorsal view of phallus of Dermapteron *Arixenia esau* (?) Jordan.

Fig. 31. Ventral view of phallus of Dermapteron *Arixenia esau* (?) Jordan.

Plate IV.

Fig. 32. Dorsal view of Embiid *Embia major* Imms.

Fig. 33. Lateral view of Zorapteron *Zorotypus guineensis* Silv., female specimen (?) after Silvestri, 1913.

Fig. 34. Ventral view of Embiid *Embia major* Imms.

Fig. 35. Dorsal view of Phasmid *Phyllium.*

Fig. 36. Ventral view of Zorapteron *Zorotypus javanicus* Silv., female specimen (?), after Silvestri, 1913.

Fig. 37. Ventral view of Embiid *Oligotoma* sp., female specimen (?).

Fig. 38. Lateral view of Embiid *Oligotoma* sp., female specimen (?).

Fig. 39. Caudal view of Isopteron *Termopsis angusticollis* (?).

Fig. 40. Lateral view of Isopteron *Termopsis angusticollis* (?).

Fig. 41. Ventral view of Phasmid *Phyllium* sp.

Fig. 42. Lateral view of Phasmid *Timema californica* Scud.

Fig. 43. Lateral view of Embiid *Embia major* Imms.

Fig. 44. Lateral view of Isopteron *Termes bellicosus* (?).

Plate V.

Fig. 45. Dorsal view of phallus of "Locustid" *Peranabrus scabricollis.*

Fig. 46. Dorsal view of phallus of "Locustid" *Stenopelmatus* nymph.

Fig. 47. Ventral view of phallus of "Locustid" *Stenopelmatus* sp.

FIG. 48. Lateral view of Tridactylid Orthopteron *Ellipes minuta* Scud., male (?).

FIG. 49. Dorsal view of phallus and titillator of Gryllotalpid Orthopteron *Gryllotalpa* sp.

FIG. 50. Lateral view of Phasmid nymph of *Aplopus mayeri* Caudell.

FIG. 51. Ventral view of Phasmid *Anisomorpha buprestoides* Stoll.

FIG. 52. Ventral view of Phasmid *Aplopus mayeri* Caudell, nymph.

FIG. 53. Lateral view of Phasmid *Timema californica* Scudder.

FIG. 54. Dorsal view of phallus of Phasmid *Anisomorpha buprestoides* Stoll.

FIG. 55. Lateral view of Phasmid *Phyllium* sp.

FIG. 56. Lateral view of terminalia of "Locustid" Orthopteron *Scudderia furcata* Brunner.

FIG. 57. Ventral view of "Locustid" *Peranabrus scabricollis.*

FIG. 58. Lateral view of Acridiid Orthopteron *Dissosteira carolina* (?).

FIG. 59. Lateral view of Phasmid *Ectatosoma* sp.

FIG. 60. Dorsal view of phallus and hypandrium of "Locustid" *Scudderia furcata* Brunner.

FIG. 61. Lateral view of "Locustid" *Peranabrus scabricollis.*

FIG. 62. Lateral view of Phasmid *Anisomorpha buprestoides* Stoll.

FIG. 63. Lateral view of "Locustid" *Stenopelmatus* sp.

FIG. 64. Dorsal view of phallus and hypandrium of "Acridiid" *Dissosteira carolina.*

FIG. 65. Ventral view of Phasmid *Timema californica* Scudder.

PLATE VI.

FIG. 66. Lateral view of phallus and titillator of Œcanthid tree cricket (the specimens from which these figures were drawn were destroyed before I had determined the genus and species).

FIG. 67. Dorsal view of phallus of Blattid *Periplaneta americana* L.

FIG. 68. Ventral view of phallus of Blattid *Periplaneta americana* L.

FIG. 69. Ventral view of phallus of an Œcanthid tree-cricket.

FIG. 70. Dorsal view of phallus and hypandrium of an immature Mantid *Humbertiella indica* Sauss.

FIG. 71. Lateral view of Mantid *Stagmomantis limbata* Hahn.

FIG. 72. Ventral view of roof of phallus of an Œcanthid tree-cricket.

FIG. 73. Lateral view of an Œcanthid.

FIG. 74. Dorsal view of titillator and part of phallus of an Œcanthid.

FIG. 75. Phallus of Mantid *Humbertiella indica* Sauss., dorsal view.

FIG. 76. Lateral view of "Locustid" *Atlanticus davisi* R. & H.

FIG. 77. Lateral view of Blattid *Periplaneta americana* L.

FIG. 78. Phallus of Mantid *Stagmomantis limbata* Hahn., dorsal view.

FIG. 79. Phallus of Mantid *Stagmomantis limbata,* ventral view.

PLATE VII.

FIG. 80. Ventral view of phallus and terminalia of Blattid *Blaberus atropos* (?).

FIG. 81. Dorsal view of phallus of Blattid *Balberus atropos* (?).

FIG. 82. Ventral view of "phallus" region and terminalia of Blattid *Leucophæa maderæ* Fab.

FIG. 83. Dorsal view of Blattid *Cryptocercus punctulatus* Scudder, phallus.

FIG. 84. Lateral view of nymph of Odonatan *Anax junius* Drury.

FIG. 85. Ventral view of Odonatan *Gomphus villosipes,* diagrammatic figure.

FIG. 86. Dorsal view of terminal portion of phallus of Proturan *Eosentomon* sp. after Prell, 1913.

FIG. 87. Ventral view of ninth segment of Japygid *Anajapyx vesiculosus* Silv., with genital papilla. From Silvestri, after Berlese, 1909.

FIG. 88. Ventral view of genital papilla of Sminthurid *Sminthurus fuscus* L., from Willem, after Berlese, 1909.

FIG. 89. Ventral view of Embiid *Embia* sp.

FIG. 90. Dorsal view of Embiid, *Embia* sp.

FIG. 91. Ventral view of phallus of Blattid *Cryptocercus punctulatus* Scudder.

FIG. 92. Lateral view of Blattid *Cryptocercus punctulatus* Scudder.

FIG. 93. Lateral view of terminalia of female of *Grylloblatta campodeiformis* Walk.

FIG. 94. Ventral view of common Lepismid.

FIG. 95. Ventral view of genital segment and phallus of Lepismid *Nicoletia subterranea* Silv., after Escherich, 1905.

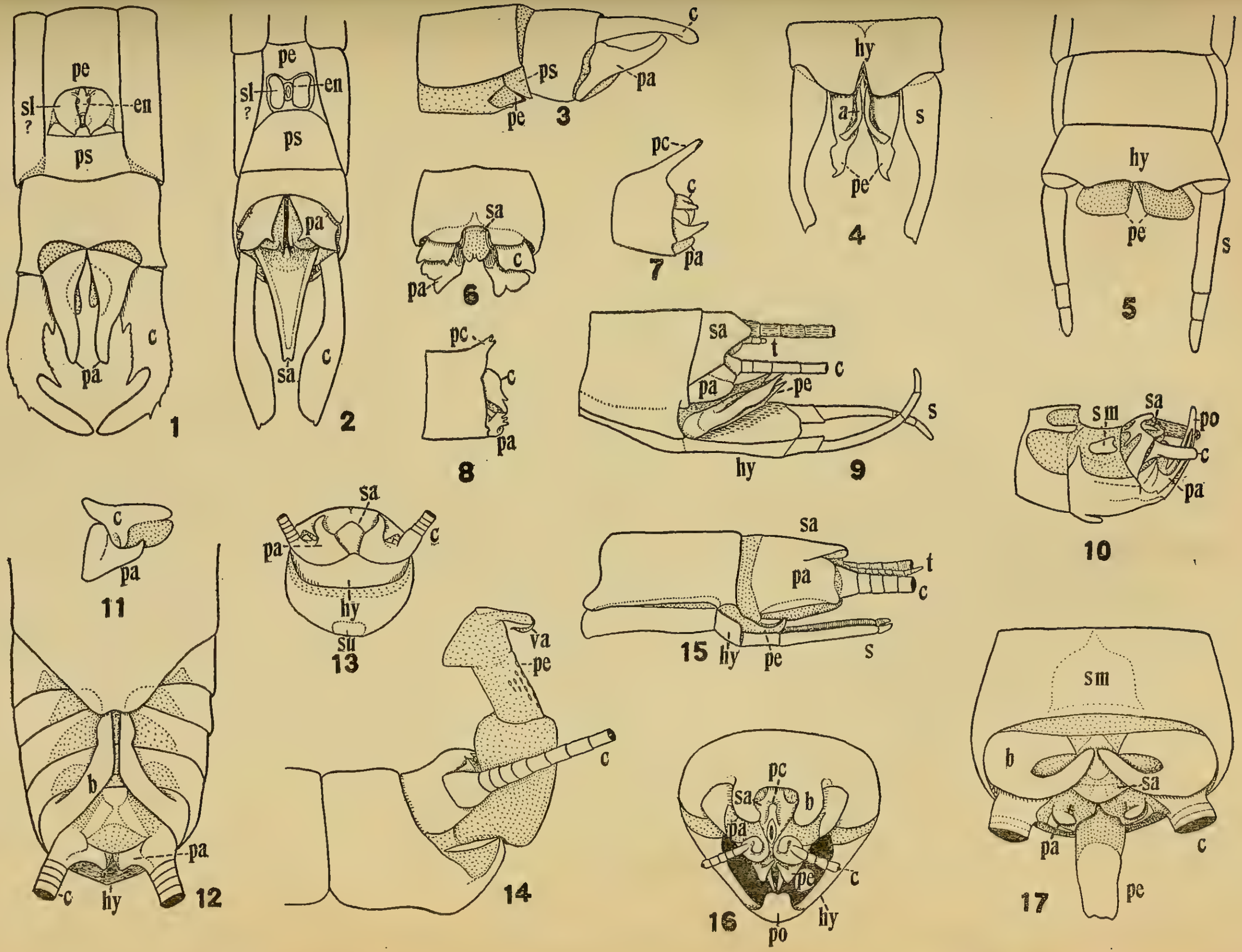
FIG. 96. Ventral view of Blattid *Blattella germanica* L.

FIG. 97. Ventral view of phallus and terminalia of Blattid *Blattella germanica* L., sternum removed.

FIG. 98. Ventral view of genital segment and phallus of Machilid *Machilis polypoda,* diagrammatic figure from several sources.

FIG. 99. Caudal view of Blattid *Parcoblatta* (*Ischnoptera*) *pennsylvanica* De.G.

FIG. 100. Lateral view of Neuropteron *Chauliodes pecticornis*.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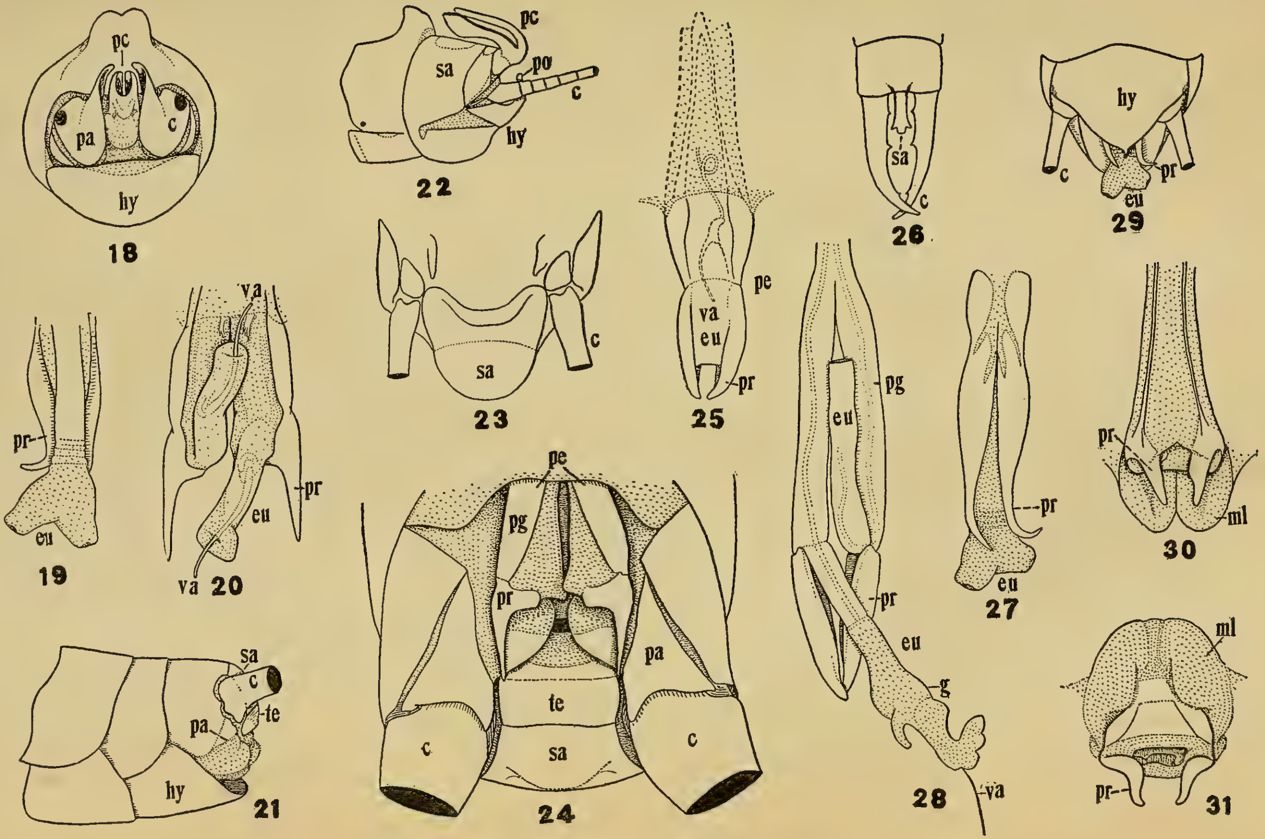
TERMINAL ABDOMINAL STRUCTURES — CRAMPTON.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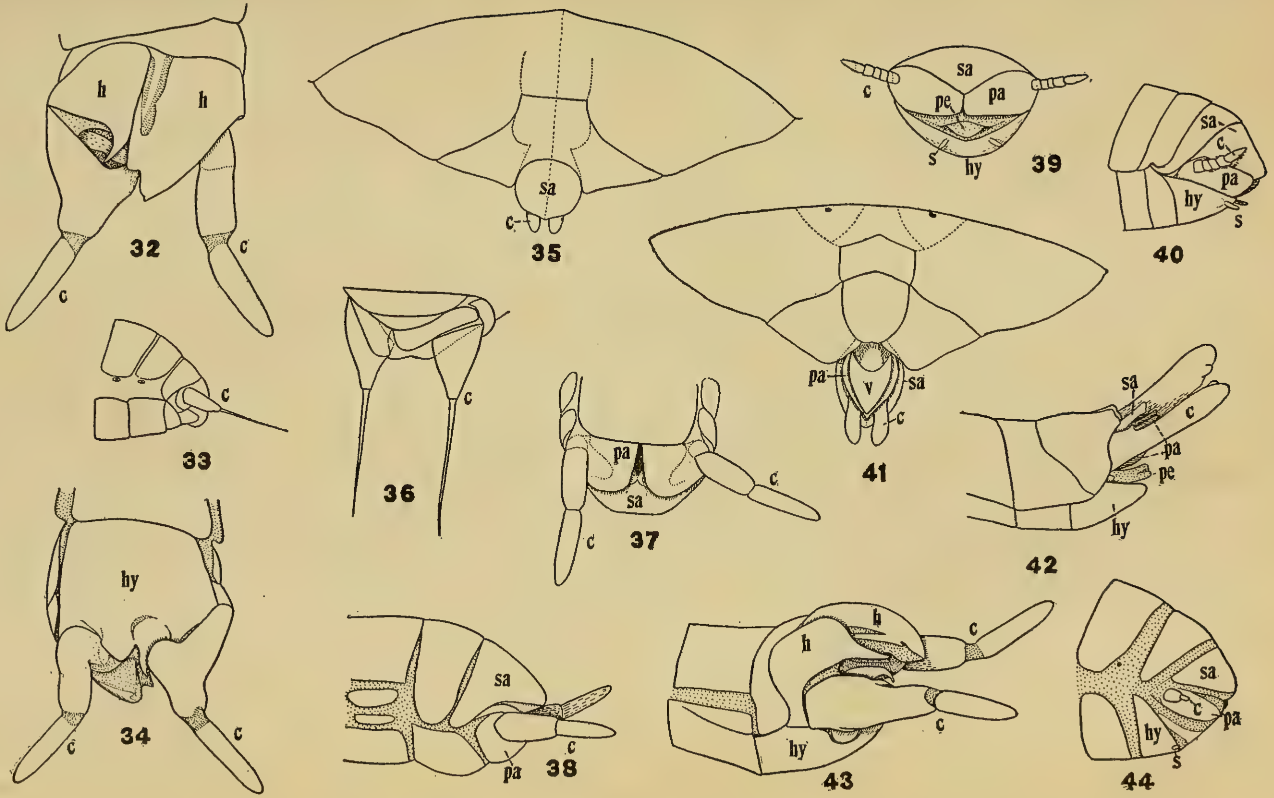
Terminal Abdominal Structures — Crampton.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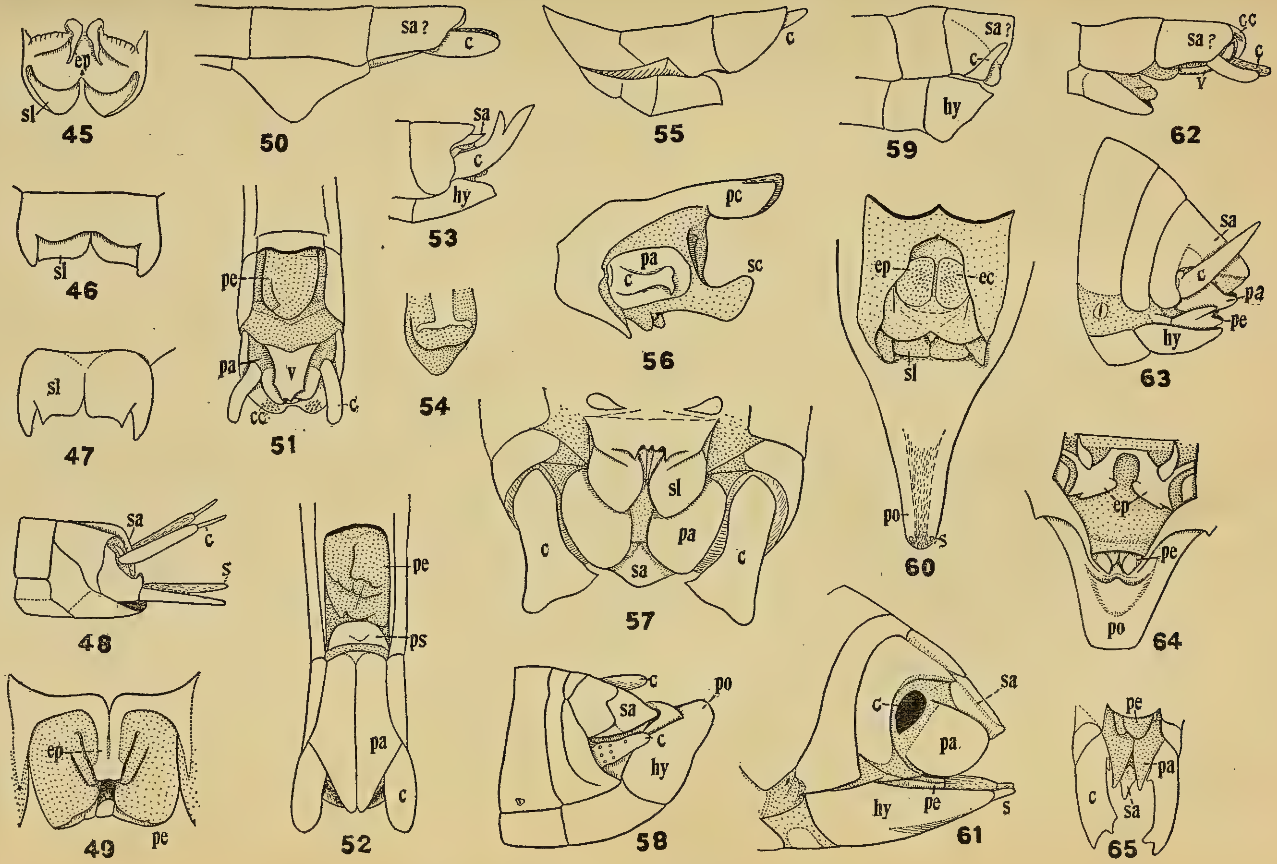
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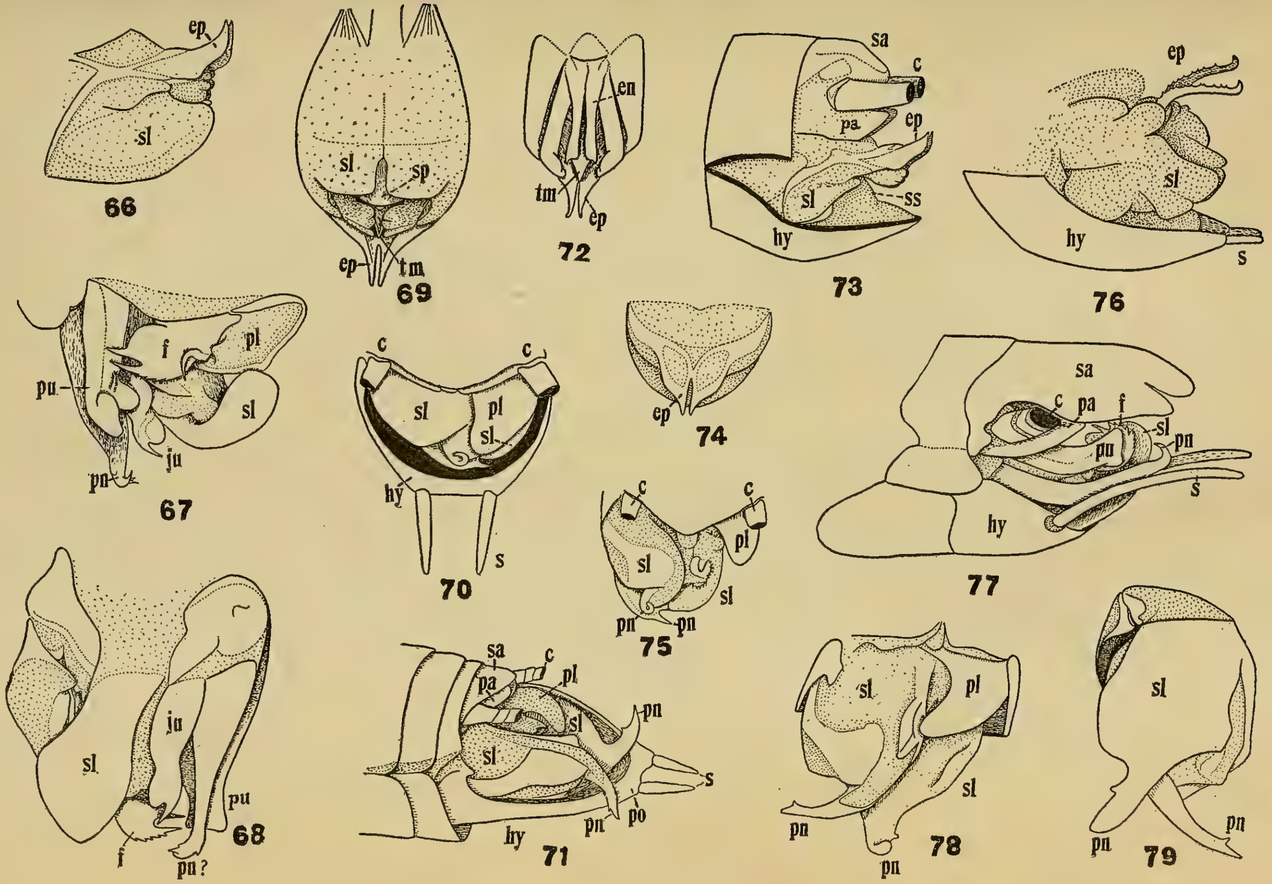
Terminal Abdominal Structures — Crampton.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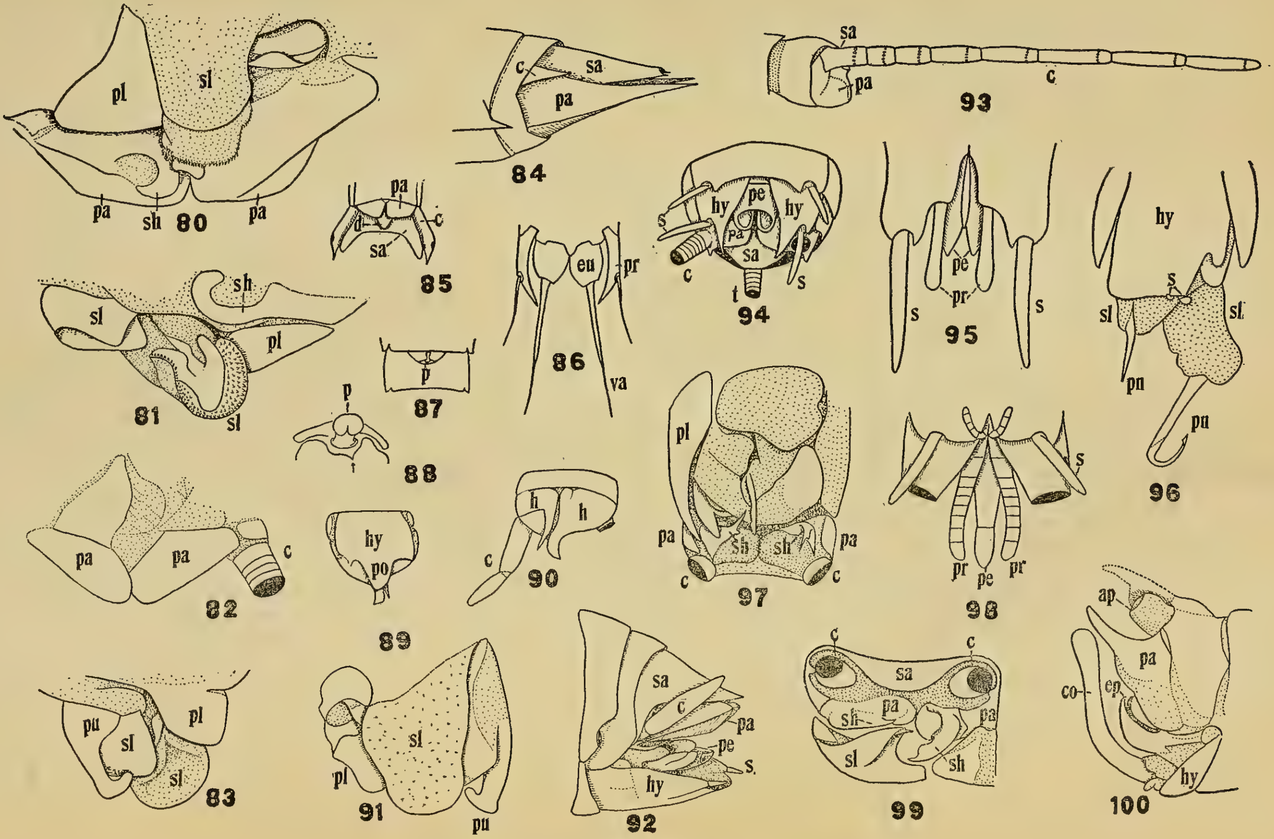
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Terminal Abdominal Structures — Crampton

LIVING PUPÆ.

Two years ago the members of the Brooklyn Entomological Society began to offer for sale cocoons of the common Saturniidæ at a cent apiece, the proceeds to add to the Society's publication fund. The price was so low that biological classes have taken them in great numbers, the material being much better for study than any other obtainable form of animal life. On this account the Society is extremely well satisfied with the results, for, although the receipts would not equal ten cents an hour for actual expenditure of time, a useful purpose has been found.

Many buyers of our cocoons have appealed to us for living pupæ of rarer insects. This demand is not easy to meet. The few dealers who handle it at all are confronted with the problem of coming short in some and having a great overplus in others. The Society now proposes to offer our most interesting pupæ for advance orders. If our members know what is wanted, they can gather the larvæ before frost time and feed them until they pupate. A dozen of our members are fond of breeding whatever interesting species they find and by offering specimens our members can be repaid to time and trouble and the BULLETIN publication fund be benefited.

We shall try to get any species desired. The list of species which we are reasonably certain to have is as follows:

	Price, Cents.		Price, Cents.
Papilio turnus	8	*Ampelophaga versicolor*	40
Papilio troilus	6	*Ampelophaga chærilus*	20
Papilio polyxenes	6	*Phlegethontius quinquemaculata*	10
Laertias philenor	8	*Phlegethontius sexta*	10
Eudamus tityrus	4	*Sphinx kalmiæ*	40
Synchloe genutia	10	*Sphinx drupiferarum*	25
Feniseca tarquinius	10	*Sphinx gordius*	40
Hemaris thysbe	8	*Sphinx luscitiosa*	30
Amphion nessus	15	*Sphinx chersis*	40
Thyreus abotti	15	*Sphinx eremitus*	30
Deidamia inscriptum	15	*Sphinx plebeia*	30
Deilephila lineata	12	*Dolba hylæus*	15
Pholus pandorus	20	*Chlaenogramma jasminearum*	80
Pholus achemon	15	*Ceratomia amyntor*	10
Ampelophaga myron	10	*Ceratomia undulosa*	10

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Ceratomia catalpe	8	*Citheronia regalis*	50
Lapara bombycoides	40	*Basilona imperialis*	15
Marumba modesta	40	*Lagoa crispata*	6
Smerinthus jamaicensis	10	*Sibine stimulea*	6
Paonias excæcatus	10	*Euclea indetermina*	6
Paonias myops	10	*Euclea chloris*	10
Paonias astylus	50	*Euclea delphini*	10
Cressonia juglandis	10	*Adoneta spinuloides*	60
Philosamia cynthia	1	*Phobetron pithecium*	20
Samia cecropia	1	*Prolimacodes scapha*	6
Callosamia promethia	2	*Apatelodes terrefacta*	6
Callosamia angulifera	25	*Apatelodes angelica*	12
Tropæa luna	20	*Hyparpax aurora*	10
Telea polyphemus	4	*Cerura borealis*	10
Automeris io	8	*Cerura cinerea*	6
Anisota stigma	6	*Alypia octomaculata*	6
Anisota senatoria	6	*Euthisanotia unio*	6
Anisota virginiensis	10	*Euthisanotia grata*	10
Anisota rubicunda	8	*Psychomorpha epimenis*	10

OFFERTA ET DESIDERATA

JAMES SINCLAIR, dealer in RARE INSECTS, Los Angeles, Cal., offers many rare species, such as *P. pergamus, P. indra, P. brevicauda, P. Pregonia, Cossus centerensis* and many others. List Free.

WANTED—in series for cash of exchange—beetles of the genus *Serica* (Scarabæidæ) from all parts of North America. *Cicindela lincolniana* Casey among the exchanges offered. R. W. Dawson, Department of Entomology, University Farm, Lincoln, Nebraska.

FLORIDA Insects of all orders, also Fish, Batrachians, Reptiles, Shells, and Marine Invertebrates sold by A. G. Reynolds, Gulfport, Fla.

WANTED.—No. Am. Cerambycidæ and Buprestidæ, especially *Agrilus;* will collect insects of any order in this locality for exchanges in above families. C. A. Frost, 26 Pond St., Framingham, Mass.

THE UNDERSIGNED will greatly appreciate receiving records of New Jersey species not listed in Smith's Insects of New Jersey. Harry B. Weiss, 242 Raritan Ave., New Brunswick, N. J.

FINE SPECIMENS of the large Mantis, *Paratenodera sinensis,* collected at Mt. Airy, Philadelphia, Pa., offered in exchange for North American Lepidoptera. Philip Laurent, 31 East Mt. Airy Ave., Philadelphia, Pa.

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I COLLECT for cash local Insects in all Orders. Printed price list of nearly 1,000 species Coleoptera in Henshaw Nos. A. H. Manee, Southern Pines, N. C.

LOT of 100 South American butterflies and moths in perfect condition, papered, at $6.50; including *Morpho menelaus* or *cypris, Caligo,* 8 *Papilios,* 8 *Heliconius, Prepona, Perisamia, Catagramma, Calicore,* 4 *Apatura, Nymphalidæ, Urania,* Sphingidæ, etc., etc. H. S. Parish, 81 Robert St., Toronto, Can.

WANTED.—2d 3d, 4th, 8th, 9th Annual Report of the Entomological Society of Ontario. Will pay a reasonable price for any of the above reports. Jos. I. Beaulne, 3653 Notre Dame East, Montreal, Canada.

WANTED.—19th Illinois Entomological Report; Coleoptera of Southern California, by H. C. Fall; Notes on Lachnosterna of Temperate North America, by John B. Smith; Works of Thos. Say, Le Conte edition. Joe S. Wade, U. S. Bureau of Entomology, Washington, D. C.

WANTED.—Vols. 1, 2 and 3, Bulletin Brooklyn Entomological Society, in original paper wrappers. Will give same finely bound and pay postage both ways. Address R. P. Dow, Editor, 15 Broad St., New York.

WANTED.—North American Orthoptera from localities which are little known or in which but little collecting has been done. Material from the mountainous regions of the West particularly desired. M. Hebard, Academy of Natural Sciences, Philadelphia, Pa.

WANTED.—Sphingidæ from any part of the world. Will purchase or exchange. B. Preston Clark, 55 Kilby St., Room 35, Boston, Mass.

WANTED for cash—Ova of Catocalæ with or without parent moth. Address George J. Keller, 191 Avon Ave., Newark, N. J.

WANTED.—Imagos of *Saperda candida, Pholus pandorus,* all stages of *Macrodactylus subspinosus* except imagos, and other material of economic importance. Ward's Natural Science Establishment, 84 College Ave., Rochester, N. Y.

WANTED.—All kinds of material for Life Histories. Lepidoptera, Coleoptera, Hymenoptera, Diptera, etc., etc. Herman H. Brehme, Box 432, South Amboy, N. J.

Wanted.—Lintner's Injurious Insects, 1886 and 1887 (Rep. 3 and 4). N. Y. Park Rep. 1873–1896. Jour. Appl. Microscopy, I^9. Monthly Bul. Calif. Com. Hort., I^{8-10}; II^{3-5}; IV^3. Send stamp for list of publications for sale or exchange. Philip Dowell, Port Richmond, N. Y.

BARGAIN.—Splendid collection of Lepidoptera (about 1,500 specimens), from all parts of the world; mostly in Denton's patent tablets; oak case; suitable gift for school, institution or collector; $150, value $500. —Wimmer, City Court, 32 Chambers St., New York City.

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Vol. XIII OCTOBER, 1918 No. 4

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INTRODUCTION OF PALÆARCTIC PREYING MANTIDS INTO THE NORTH ATLANTIC STATES.

By Wm. T. Davis, Staten Island, N. Y.

In Entomological News for June, 1898, there is a short account by Philip Laurent of the capture of a female mantis, *Tenodera sinensis* (Saussure), in the garden of Mr. Joseph Hindermeyer, Mt. Airy, Philadelphia, October 16, 1897. A plate made from a photograph of the insect accompanies the article.

From this time on we find as many as twenty-six references to the species in the pages of Entomological News. The insect appears to have spread from Meehan's nursery, where the egg masses were found by Ella Jacobs in March, 1898, and Mr. Laurent presented to the Academy of Natural Sciences of Philadelphia two females taken in Meehan's nursery, Germantown, in 1898. Mr. Laurent states in the News for 1899, page 273, that he received his first specimens from the nursery in 1896. The egg masses are reported as being in great abundance at Mt. Airy, Philadelphia, in the fall of 1900. At a meeting of the Feldman Collecting Social held November 20, 1901, Professor J. B. Smith recorded *Tenodera sinensis* from Elizabeth, New Jersey, but could not find any egg masses. On page 62, Vol. XIII, 1902, Mr. Laurent states that he had gathered about half a barrel of egg masses of *Tenodera* at Mt. Airy, and that the insect preferred blackberry and briar bushes as a place of abode, and avoided low ground with low herbage.

The egg masses of this beneficial insect were given to several entomologists, who distributed them over various parts of New Jersey, and in 1908 H. W. Wenzel found many specimens in several places at Anglesea.* At the time of Mr. Wenzel's report, Prof. Smith said that he had egg masses of *Tenodera* put out from the Orange Mountains to Burlington County, and at not a single place had the insect established itself; "individual specimens have been found here and there, showing that they have just only maintained themselves."

In Entomological News for December, 1911, p. 478, "Mr. Schmitz said that at Anglesea . . . he had seen a mantis *Paratenodera* feeding upon a Cicada." In the same journal for June, 1914, p. 279, there is an article entitled "Some Facts about the Egg Nest of *Paratenodera sinensis*," by Harry B. Weiss, wherein it is shown by experiment, that the eggs protected in their bulky envelope, are not subjected to sudden changes in temperature.

From the foregoing it would be expected that this hardy insect would be found in various parts of New Jersey, and we can now record several specimens from Staten Island, N. Y. In the summer of 1902 two male *Paratenodera* were raised in the writer's garden at New Brighton from egg masses received from Mr. Laurent of Philadelphia, and in the same year egg masses were placed in suitable situations in the Clove Valley. In the summer of 1913 two more males were raised in the writer's garden on Staten Island, and egg masses were placed in briar tangles at Yaphank on Long Island.

In the fall of 1916 two specimens were brought to the Curtis High School, Staten Island, by Mr. Bennett, janitor of the building. They were collected at Mariners' Harbor. On October 17, 1917, Mr. Edward J. Burns informed me that Mr. Bennett had that day brought in another mantid collected on the side of his house, 229 South Ave., Mariners' Harbor.

On September 6, 1917, Mr. Thomas Bryan brought to the Public Museum of the Staten Island Association of Arts and Sciences a living female mantis collected by a friend of his at Lockman Ave., Mariners' Harbor.

On October 15, 1917, Mr. Elliott Merrill, of Mariners' Harbor, sent a living male mantis to the Public Museum, Staten Island.

From the foregoing it will be seen that *Paratenodera sinensis* has probably established itself on Staten Island, but whether through the egg masses put out in 1902 and later, or from some New Jersey source, remains unknown.

---

* Entomological News, March, 1909, p. 142.

It may be added that egg masses of this species have on two occasions been placed in the shrubbery in Bronx Park, but Mr. Raymond L. Ditmars informs me that the insect has failed to establish itself. This is probably owing to the great number of squirrels, who energetically investigate all likely sources of food supply, and no doubt destroyed the egg masses. Mr. Charles E. Snyder, of the New York Zoölogical Garden, has placed egg masses about his home at Scarsdale, N. Y., and though a mature mantis was later discovered, nothing further has been seen of the insect. Egg masses have also been put out at Whitestone, Long Island, but no results have been reported.

Mr. George P. Engelhardt, of the Brooklyn Museum, informs me that Dr. Felix Metzner, six or seven years ago, secured several egg clusters of *Paratenodera* from the Philadelphia colony, and placed them in his garden, 142 Woodbine Street, Brooklyn. This new colony has maintained itself ever since, and a number of adult mantids have been found by Dr. Metzner, or have been brought to him by neighbors each year. Two egg clusters of 1917 are in his city garden at the present time.

In Entomological News for December, 1899, Prof. M. V. Slingerland has an article on the Occurrence of *Stagmomantis carolina* in New York. The specimens were collected by Mr. H. F. Atwood at Rochester, N. Y., and in his letter to Prof. Slingerland he states that the insect was also taken "about Charlotte and Summerville."

The species referred to in the above-mentioned article was really the European *Mantis religiosa* Linn. In Psyche, October, 1900, p. 119, Mr. S. H. Scudder has a note on "Mantis Religiosa in America," in which he refers to specimens sent to him by Prof. Slingerland. He gives the distribution of the species as "southern Europe and in Asia as far as Hindustan and Java, and in Africa as far south as Zanzibar." This species and its introduction into New York state was later interestingly discussed by Prof. Slingerland in Bulletin 185, Cornell University Agricultural Experiment Station, November, 1900.

In Entomological News, April, 1914, p. 178, there is an article on "*Mantis religiosa* Linnæus in Rochester, New York, in 1913," by Robert Schmaltz, wherein the habits of the females in hiding under long grass, etc., is mentioned. The species is now, through the efforts of Prof. Slingerland and others, well established about Ithaca, N. Y., and in my collection are three males from there, taken by Mr. George P. Engelhardt in August, 1914. This species will probably spread slowly over New York state and elsewhere.

I have made an effort to rear in my garden on Staten Island the native *Stagmomantis carolina,* found as far north as the District of Columbia and southern New Jersey, but so far have not succeeded in bringing the young to maturity. Probably this was due to insufficient food. The largest nymph raised measured twenty-five millimeters. This insect has, however, been bred to maturity as far north as Staten Island, but has failed to establish itself. In the Report U. S. Dept. of Agriculture, 1862, p. 377, S. S. Rathvon has this to say of the eggs of *Stagmomantis carolina:* "The amount of cold these eggs are capable of bearing may be inferred from the fact that the Mantis has been successfully raised for two or three consecutive seasons within the limits of Lancaster City, Pa., from eggs brought here from Maryland during which time, on several occasions, the cold had been from four to ten degrees below zero."

In the Report U. S. Dept. of Agriculture, 1866, p. 40, Townend Glover says of *Mantis carolina:* "The insects have been successfully raised as far north as the Hudson river, by bringing the egg cases from the middle states, several cases being found fastened to the trees the next autumn, but after that they disappeared entirely." This experiment took place probably at Fishkill Landing on the Hudson River, for Townend Glover gave that as his address in the Agricultural Report for 1858 in connection with an article on "Insects Frequenting the Orange Trees of Florida."

A NEW KLEOTHRIPS (THYSANOPTERA) FROM NORTH QUEENSLAND.

By J. Douglas Hood, Washington, D. C.

Kleothrips acanthus, new species. (Pl. VIII, figs. 1–4.)

Male (*macropterous*).—Length about 7.3 mm. Color dark blackish brown, with the intervals between the thoracic plates and ill-defined patches on sides of basal and intermediate abdominal segments, bright red; femora dark blackish brown, paler at either end; tibiæ of fore pair bright yellow, narrowly darkened along the entire inner and outer surfaces; intermediate and hind tibiæ yellow at extreme base and in distal half, the intervening portion blackish brown and paler distally; tarsi bright yellow, pulvilli nearly black; wings clear, with a pale yellow median streak; antennæ yellow, with the two basal and two apical segments blackish brown and the intermediate segments darkened apically, segment 3 dark in apical seventh, segment 4 dark in apical third, 5 in apical two fifths, and 6 in apical two thirds.

Head about four times as long as width across eyes, sides nearly straight and converging to just behind eyes, the width of the head at this point being 0.65 the basal width; produced portion of head about as long as width across eyes, sides slightly concave and converging to base; dorsal and lateral surfaces of head transversely striate and with about six pairs of prominent lateral bristles in addition to numerous smaller ones; postocular bristles longer than eyes and pointed, their bases slightly closer to eyes than the length of the latter; a second pair of similar bristles about midway between postoculars and base of head, less widely separated than postoculars; postocellar bristles three fourths the length of postoculars; anteocular bristles similar to and of the same length as postoculars. Eyes very prominent, bulging, about 0.18 as long as head, usually slightly narrower in dorsal aspect than their interval, and slightly longer on dorsal surface than on ventral. Ocelli of posterior pair distinctly larger than anterior ocellus and situated slightly in front of middle of eyes; anterior ocellus situated slightly behind middle of produced portion of head. Antennæ (Pl. VIII, fig. 4) about 1.48 times as long as head, very slender, length and width of each segment given below under "Measurements"; segment 6 slightly prolonged on ventral surface at apex; sense cones short, slender, and pointed.

Prothorax about 0.32 as long as head and (inclusive of coxæ) about 1.65 times as wide as long, surface smooth; all usual bristles present, pointed, the two pairs at the posterior angles longest, the anterior angulars arising from near the middle of the dorsal surface of a prominent, acute, forwardly-directed tooth arising from the notal plate. Wings of equal width throughout, the fore pair with about fifty accessory hairs on posterior margin near apex and with the subbasal bristles long and pointed, the third longest and subequal to postoculars. Fore femora swollen, with a stout acute tooth on inner surface near apex, and a stouter truncate projection on ventral surface near apex (Pl. VIII, fig. 2); fore tibiæ on inner surface with a stout bristle-bearing tooth near apex, and a simple, more acute tooth near base; fore tarsi with a long, straight, acute tooth arising at a right angle.

Abdomen broadest at base, where it is only slightly wider than prothorax, very long and slender, tapering uniformly to tube, dorsal surface finely reticulate with anastomosing lines; segment 8 subequal in length to tube and approximately twice as long as segment 9. Tube smooth, tapering almost evenly from base to apex, 0.55 as long as head, and about five times as long as basal width, which is about 1.5 times the apical. Bristles pointed; terminal ones brown, equal in length to tube and shorter and darker than those on segment 9; bristles on segments 1–8 paler, long and slender, each segment with from one to three pairs which are subequal in length to postoculars.

Measurements of holotype (♂): Length 7.3 mm.; head, length 1.22 mm., width across eyes 0.301 mm., width in front of eyes 0.124 mm., width behind eyes 0.198 mm., width at base 0.304 mm., length of produced part 0.300 mm.; eyes, length 0.216 mm., width 0.091 mm.; postocular bristles, length 0.240 mm.; prothorax, length 0.391 mm., width (inclusive of coxæ) 0.648 mm.; abdomen, greatest width 0.660 mm., length of segment 8, 0.624 mm., length of segment 9, 0.320 mm.; tube, length 0.672 mm., width at base 0.132 mm., at apex 0.083 mm.

Antennal segments:	1	2	3	4	5	6	7	8
Length (μ)	126	108	486	376	294	197	118	102
Width (μ)	75	55	54	50	45	36	28	21

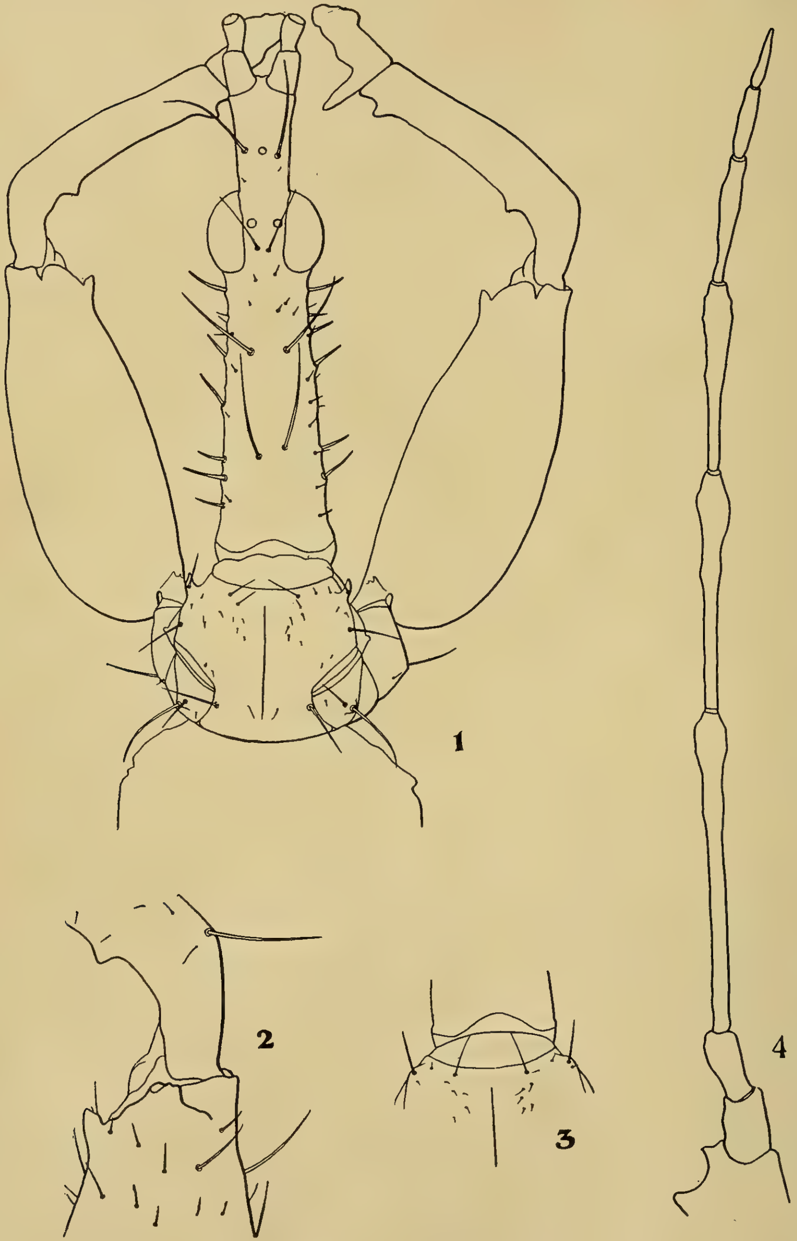
Total length of antenna, 1.807 mm.

Female (*macropterous*).—Length about 6.9 mm. Similar to male in color and structure except as follows:

Head about 3.58 times as long as width across eyes, width behind eyes 0.68 the basal width; produced portion of head slightly shorter than width across eyes; lateral surfaces with about four pairs of prominent lateral bristles in addition to a few smaller ones.

Prothorax (inclusive of coxæ) about 1.9 times as wide as long; anterior angular bristles arising from very low broad warts (Pl. VIII, fig. 3). Fore femora slender, absolutely unarmed; fore tibiæ and fore tarsi also unarmed.

Abdomen slender but broader than in male, the greatest width about 1.24 times that of prothorax; segment 8 only slightly longer than segment 9 and only 0.44 as long as tube. Tube 0.79 as long as head and about 5.6 times as long as basal width, which is about 1.9 times the apical.



KLEOTHRIPS ACANTHUS — HOOD

Measurements of allotype (♀): Length 6.9 mm.; head, length 1.10 mm., width across eyes 0.307 mm., width in front of eyes 0.132 mm., width behind eyes 0.222 mm., width at base 0.324 mm., length of produced part 0.270 mm.; eyes, length 0.215 mm., width 0.091 mm.; postocular bristles, length 0.240 mm.; prothorax, length 0.352 mm., width (inclusive of coxæ) 0.696 mm.; abdomen, greatest width 0.864 mm., length of segment 8, 0.384 mm., length of segment 9, 0.330 mm.; tube, length 0.864 mm., width at base 0.152 mm., at apex 0.078 mm.

Antennal segments:	1	2	3	4	5	6	7	8
Length (μ)	120	108	432	—	—	—	—	—
Width (μ)	75	56	54	—	—	—	—	—

Described from four males and one female collected by Mr. A. A. Girault in North Queensland, Australia, as follows: Proserpine, November 3, 1912, 1 ♂, swept from foliage and grass in open forest; Nelson, May 11 and 25, 1913, and June 2, 1914, 3 ♂♂, sweeping in jungle; Nelson (no date given), 1 ♀, sweeping in jungle.

It is difficult to state just how this species differs from *K. simplex* (Bagnall), described from the Philippines, though it would appear to be distinct by the shorter tube and the prominent prothoracic denticle of the male.

Explanation of Plate VIII.

Fig. 1. *Kleothrips acanthus* new species. Head and prothorax, male, holotype (bristles on appendages not shown).

Fig. 2. *Kleothrips acanthus.* Fore knee (left), ventral view, male, holotype.

Fig. 3. *Kleothrips acanthus.* Portion of prothorax and head, female, allotype.

Fig. 4. *Kleothrips acanthus.* Right antenna, male, holotype.

Philosamia cynthia.—Of several thousand cocoons gathered last winter, emergence was normal in those collected in December. Of those collected after January 1, not one emerged. Dissection showed they were frozen to death. The winter was the coldest in history and it is to be supposed that the species, imported from China about 1867, is now nearly extinct in this climate. Information on the point will be welcome.

THE GENUS SERICOPHANES WITH DESCRIPTIONS OF TWO NEW SPECIES. (MIRIDÆ, HEMIP.)*

By Harry H. Knight, Ithaca, New York.

The species of *Sericophanes* have scarcely been known to students of Hemiptera, though the genus was founded by Reuter in 1876 on the single species *ocellatus,* in his paper "Capsinæ ex America boreali in Museo Holmiensi asservatæ descriptæ ab."† While traveling through the southwestern United States with the Cornell Biological Expedition in 1917 the writer collected the type species of the genus and two other new forms which are described in the present paper.

The genus *Sericophanes* is characterized by the claws bearing free arolia with converging tips, third segment of the antennæ equally thick as the second; males macropterous, slender, hemelytra more or less constricted at the middle, thorax campanulate, the apex of the pronotum scarcely greater than the width of the vertex; females brachypterous, ant-like, abdomen short and broad.

Key to the Males of Sericophanes.

1. With an ocellate cream colored spot at the middle of the clavus, more or less pruinose on the hemelytra, scutellum not noticeably arched (2)
   Spot on the clavus not distinctly ocellate, transverse and extending onto the corium, or entirely lacking, scutellum distinctly arched........(3)
2. Smaller, very slender, body yellowish brown..........*ocellatus* Reuter.
   Larger, body dark chestnut brown..................*noctuans* Knight.
3. Yellowish brown, a triangular white area each side on the corium having its apex on the clavus.............................*triangularis* n. sp.
   Dark chestnut, a transverse white area on the clavus and extending upon the corium..............................*transversus* n. sp.

Sericophanes ocellatus Reuter. (Caps. Amer. Bor., p. 79, 1876.)

The males of this rare and interesting little species were taken by the writer at different points in Texas while collecting with a tent trap light in the semiarid regions. It is evident that Belfrage must have obtained much of his material by collecting at lights for it was only in such manner that the writer found *ocellatus* and certain other Reuter species of which Belfrage furnished the type material from Texas. The females of *ocellatus* were not taken, though the wingless females of this tiny form must have been present on the low grasses, as has been found in the case of *noctuans* and *transversus.*

---

* Contribution from the Department of Entomology of Cornell University.

† Öfversight af Kongl. Vetenskaps-Akademiens Förhandlingar, 1876, No. 9, Stockholm.

Records: 6 ♂♂, June 22, Devers, Texas; 7 ♂♂, June 23, Richmond, Texas; 4 ♂♂, June 25, Victoria, Texas; all collected by the writer on the tent trap light.

After much sweeping and beating only two specimens of *Phytocoris breviusculus* were taken on mesquite while at night the species came in numbers to the trap light. *Tiryas punctulatus* was another species that was taken at the trap light while no amount of sweeping and beating would reveal its presence in the day time.

Sericophanes triangularis n. sp.

Slightly larger and broader than *ocellatus;* readily distinguished by the white triangular patches on the hemelytra, one at each side extending from the margin inward, the apex reaching the middle of the clavus; a second pair of transverse or triangular pale areas across the tips of the corium bordering the cuneus. General color dark yellowish brown, the hemelytra dull pale orange except for the triangular white spots with narrow fuscous borders.

♂. Length 3.4 mm. *Head:* width across the eyes .65 mm., vertex .28 mm., length .43 mm.; brown, shining, slightly paler on the lower side of the face; eyes large and coarsely granulated, extending back at the sides and forming the most posterior part of the head, purplish brown in color. Rostrum brownish, reaching beyond the posterior margin of the hind coxæ and nearly to the middle of the venter.

Antennæ: segment I, length .25 mm.; II, length 1 mm.; III, length .71 mm.; IV, length .63 mm.; yellowish to fuscous.

Pronotum: length .57 mm., width at base .94 mm., apex .43 mm.; dark yellowish brown, smooth, shining, strongly declivitous, devoid of calli, collar broad and distinct, lateral margins of the disk rounded, slightly sulcate. Scutellum same color as the pronotum, strongly arched, thus differing from *noctuans* and *ocellatus;* sternum yellowish brown, metasternal orifice pale.

Hemelytra: width near apex or corium 1 mm., width at middle .94 mm.; dull pale orange and marked with silvery white and fuscous; a large silvery white triangular area on each side extending from the margin inward, the apex attaining the middle of the clavus, narrowly margined with dark fuscous; a smaller triangular white area at the tip of the corium and bordering the cuneus, also a pale spot narrowly margined with fuscous at the tip of the clavus; cuneus dark reddish; sparsely clothed with rather long pale yellowish hairs; members evenly infuscated without pale marks.

Legs: reddish brown, coxæ and basal third of the femora pale to yellowish, tips of the tarsi fuscous.

Venter: yellowish brown to reddish, paler at the base on the lower side, not so distinctly narrowed and flattened as in *noctuans;* genital claspers conspicuous and distinctive.

Holotype: ♂, July 12, 1917, Deming, New Mexico (H. H. Knight); Cornell University Collection.

Paratypes: 18 ♂♂, taken with the types; ♂, July 13, Lordsburg, New Mexico; 7 ♂♂, July 20, 1917, Texas Pass, Arizona; ♂, July 15, 1917, Bowie, Arizona; all collected at the tent trap light by the writer.

Sericophanes transversus n. sp.

Dark chestnut brown, shining, easily distinguished by the transverse white mark across the middle of the clavus and reaching upon the corium, also a smaller white spot bordering the cuneus.

♂. Length 3.7 mm., greatest width 1.14 mm. *Head:* width across the eyes .85 mm., vertex .37 mm., length .43 mm., more globose than in *triangularis* or *ocellatus;* dark brown, smooth and shining. Rostrum reaching slightly beyond the posterior margin of the hind coxæ, dark brownish in color.

Antennæ: segment I, length .31 mm.; II, length 1.14 mm.; III, length .80 mm.; IV. length .57 mm.; fuscous brown, darker on the apical half.

Pronotum: length .85 mm., width at base 1.14 mm., apex .43 mm.; dark chestnut brown, polished, apical half lighter colored; calli faintly discernible, disk more highly arched than in *triangularis;* scutellum strongly arched as in *triangularis,* sternum dark amber to reddish brown.

Hemelytra: greatest width 1.17 mm., scarcely narrowed at the middle; dark chestnut brown to blackish, highly polished; a conspicuous transverse silvery white mark across the middle of the clavus and extending onto the corium as far as the cubitus, tip of the embolium and half way across the apex of the corium bordering the cuneus, pale white; sparsely clothed with fine long golden hairs; membrane evenly infuscated.

Legs: dark fuscous brown, middle and posterior coxæ and trochanters, pale.

Venter: Dark chestnut brown, polished, clothed with moderately long fine golden pubescence; genital claspers prominent and distinctive of the species.

Female: length 3.1 mm., brachypterous, very ant-like in form, dark chestnut brown in color like the male, polished, head and thorax lighter colored than the abdomen. *Head:* nearly globose, eyes slightly smaller than in the male; restrum reaching slightly beyond the posterior margin of the hind coxæ.

Antennæ: segment I, length .28 mm.; II, length 1.03 mm.; III, length .71 mm.; IV, length .54 mm.; brownish to fuscous.

Pronotum: nearly quadrate, length .57 mm., width at base .77 mm., collar .48 mm., width behind the collar .60 mm.; scutellum greatly arched, more so than in the male.

Hemelytra: length .85 mm., barely meeting at the suture behind the scutellum, tapering out to a point at the outside margin and reflexed; transversely sulcate and pale across the middle, also pale behind the scutellum along the suture.

Venter: width 1.42 mm., broad and nearly globose, only the basal third covered by the hemelytra. Legs very similar to the male.

Holotype: ♂, June 26, 1917, Gillette, Texas (H. H. Knight); Cornell University Collection.

Allotype: taken with the type.

Paratypes: 35 ♂♂, taken with the types; 15 ♂♂, July 2, 1917, Sabinal, Texas; 15 ♂♂, July 12, 1917, Mesilla Park, New Mexico; 5 ♂♂, July 20, Texas Pass, Arizona; all collected on the tent trap light by the writer. 2 ♂♂, 2 ♀♀, June 15, 1900, Pueblo, Colorado (E. D. Ball).

This interesting species was taken only in the desert regions and is nocturnal in its habits, as are the other members of the genus. The type female though wingless had crawled up onto the tent trap light when found. Prof. E. D. Ball found this species in Colorado and *noctuans* in Ohio, both occurring on grasses. It is evident that these species hide away during the day time and become active only at night.

"The type specimen of the noctuid moth, *Dasyspondea lucens* Morrison, heretofore considered as lost, has been located by Mr. Doll and is now deposited in the collection of the Brooklyn Museum of Arts and Sciences."

BEES AND STREPSIPTERA.

By Charles Robertson, Carlinville, Ill.

When I was preparing the paper on the "Hosts of Strepsiptera" which was published in the Canadian Entomologist, *42*: 323–30, I marked, but failed to make comment on, the following paragraph from Mr. W. Dwight Pierce's Monographic Revision of the Strepsiptera, U. S. Nat. Mus. Bull., *66*: 17, 1909: "The location of the parasites is as a general rule indifferent, although the males generally occupy the basal segments and the females the apical segments. These remarks are based primarily upon a study of *Polistes annularis*. A notable exception was found in *Andrena crawfordi*, in 92 parasitized individuals, of which every parasite was located between the fourth and fifth segments."

It is not easy to see how *Polistes annularis* can form a rule to which *Andrena crawfordi* is an exception any more than the reverse. In fact the *Andrena* seems to me to resemble the usual cases, while the *Polistes* is rather exceptional.

Without the qualifying clause, "indifferent" means that finally the parasites will occur an equal number of times under each segment. The cases given by Pierce for *Polistes annularis* are rearranged in the following table:

	1.	2.	3.	4.	5.	6.
Dorsal segments:						
Males	1	21	*132*	85	29	2
Females	—	—	2	29	*106*	10
Ventral segments:						
Males	—	5	14	*16*	1	—
Females	—	—	2	3	*9*	—
General:						
Males	1	26	*146*	101	30	2
Females	—	—	4	32	*115*	10
Total	1	26	*150*	133	*145*	12

The maximum for the males is under the third dorsal and fourth ventral. The maximum for the females is under the fifth dorsal and ventral. The general maximum for the males is under the third, really the third dorsal. The total shows a maximum under the third and a secondary elevation under the fifth resulting from mixing the females and males. Pierce's "basal and apical" mean third and fifth. More males occur under 5 than under 2 and more females under 4 than 6.

The parasites observed by me occur as follows (I did not look for ventral cases):

In 100 cases 96.0 per cent. of the parasites of bees fall under the fourth segment. In the Eumenidæ 50.0 per cent. fall under 3 and 43.3 under 4.

In 55.5 per cent. of the cases in which the parasites fall in an unusual position a single host carried more than one of them.

	Specimens.	Dorsal Segments.				
		2.	3.	4.	5.	6.
Trachandrena claytoniæ	1	—	—	1	—	—
nuda	3	—	—	4	—	—
hippotes	1	—	—	1	—	—
Andrena illinoensis	2	—	—	2	—	—
mandibularis	5	—	—	6	—	—
salictaria	20	—	—	21	—	—
Ptilandrena erigeniæ	3	—	—	3	—	—
Paradrena andrenoides	14	—	—	15	—	—
Pterandrena asteris	2	—	—	2	—	—
Augochlora viridula	1	—	1	—	—	—
Chloralictus nymphæarum	1	—	—	2	—	—
zephyrus	4	—	—	6	—	—
versatus	4	—	—	5	1	—
sparsus	21	—	—	21	1	—
Pseudopanurgus labrosus	1	—	—	1	—	—
labrosiformis	1	—	—	2	—	—
solidaginis	2	—	—	2	—	—
rudbeckiæ	3	—	—	2	1	—
Bees, total	89	—	1	*96*	3	—
Ancistrocerus tigris	2	—	3	—	—	—
Leionotus histrio	2	—	2	—	—	—
fundatus	2	—	2	—	—	—
ziziæ MS.	1	—	1	—	—	—
clypeatus	2	—	2	1	—	—
anormis	3	—	2	1	—	—
Odynerus erinnys	3	—	2	1	—	—
Total	15	—	*14*	3	—	—
Leionotus histrionalis	2	1	—	1	—	—
foraminatus	2	—	1	2	—	—
arvensis	2	—	—	3	—	—
fundatiformis	1	—	—	2	—	—
bifurcus	1	—	—	1	—	—
turpis	1	—	—	1	1	—
Total	9	1	1	*10*	1	—
Eumenidæ, total	24	1	*15*	13	1	—
Proterosphex ichneumoneus	1	—	1	1	—	—
Sphex vulgaris	3	—	—	1	3	—
pictipennis	1	—	—	—	1	—
Total	5	—	1	2	4	—
Polistes variatus	1	—	—	—	—	1
Total wasps	30	1	*16*	15	5	1
Total bees	89	—	1	*96*	*3*	—

NOTES ON NORTH AMERICAN TINGIDÆ (HEM.–HET.).

By Carl J. Drake, New York State College of Forestry.

Corythucha immaculata Osborn and Drake. I have numerous specimens of this insect from California, Oregon, Washington, Idaho and Montana. The Montana specimens were taken on balsam-root, *Balsamorrhiza saggitata* (Pursh) Nutt., by Prof. Cooley, May 16, 1918, also at various times during the summer of 1917. The species is slightly variable in size and *C. pura* Gibson does not seem to be distinct from it.

Galeatus peckhami Ashmead. One specimen of this peculiar insect was taken at Rock City, Cattaraugus County, N. Y., by Dr. H. H. Knight.

Genus Calotingis n. gen.

Bucculæ narrow, not contiguous in front. Antennæ long, slender, the first segment a little thicker and longer than the second, the third segment very long, cylindrical, slenderest, the fourth segment fusiform. Antenniferous tubercles slender and short, a rather broad, short, lace-like structure projecting beneath the eyes. Rostral groove uninterrupted, greatly widened on the metasternum, closed at the apex by a narrow, nearly transverse ridge, a continuation of the lateral laminæ. Pronotum tricarinate; hood rather large, narrow, rounded above, extending to the apex of the head, but not covering the eyes; paranota very large, erect, forming large bulbiform processes somewhat like in the genus *Dichocysta* Champ., but not closed within by the lateral carinæ. Metasternal orifices distinct. Head with five slender spines beneath the hood, the spines arranged as in related genera. Elytra extending to far beyond the apex of the abdomen, rounded at the apices. Discoidal area not extending to the middle of the elytra, the margins raised; costal and subcostal areas rather broad. Wings present.

This remarkable American insect belongs to the group of Tingidæ that are distinctly lacy, as in *Corythucha* Stål, *Leptostyla* Stål, etc., and the areolæ are mostly hyaline. In the formation of the paranota the genus somewhat resembles the genus *Dichocysta* Champ., but readily separated from it by the hood, open bucculæ in front, slender antennæ, delicate lacy structures, etc.

Type of genus *C. knighti* sp. nov.

Calotingis knighti n. sp.

Antennæ long, slender; first segment about twice the length of the second; third segment very long, slender; fourth segment slightly swollen, fusiform. Head with the tips of anterior spines projecting out beneath the hood. Rostral laminæ greatly widened on the metasternum, the rostrum extending slightly beyond the meso-metasternal suture. Hood highly elevated, narrow, the sides nearly flat, rounded dorsally. Pronotum distinctly tricarinate; median carina moderately elevated, uniseriate, the areolæ hyaline; lateral carinæ much less elevated, rather widely separated from the hood; paranota slightly higher than the hood, the anterior and posterior margins strongly turned in and leaving an opening at the middle, the anterior margin touching the hood and the posterior margin extending over the lateral carina; apex of triangular process reticulate. Legs rather slender. Elytra with the outer margins rounded, costal area biseriate to beyond the middle and with a few extra areolæ for a short distance towards the apex, the areolæ quite large; subcostal area mostly triseriate, the areolæ small. Claspers strongly curved in the male. Wings longer than the abdomen. Length, 2.45 mm.; width, 1.2 mm.

Color.—General color yellowish white; body beneath black. Distal segment of antennæ and tarsi black. Hood and paranota mostly light fuscous, the disc of pronotum blackish. Elytra with the areolæ hyaline, a brown or light fuscous spot at the base of the discoidal area.

One male and three females, taken on *Malvaviscus Drummondii* T., at Helotes, Texas, July 1, 1917, by Dr. H. H. Knight. The insect is not very closely allied to any American tingid.

Leptoypha minor McAtee. This insect was described from two specimens taken in Siskiyou County, California. Numerous specimens are at hand from Huachuca Mts., Arizona, collected by Prof. H. G. Barber, July 15.

Leptoypha costata Parshley. Parshley, Heidemann and McAtee list this species from Maryland, Washington (D. C.) and Virginia. Numerous specimens are at hand from the above localities, also from Colorado, Arkansas and Illinois.

Leptoypha elliptica McAtee. Numerous specimens are before me from Victoria, Texas, and Stone Mt., Georgia, and one specimen from Jacksonville, Florida. The Texas specimens bear the food plant label "swamp bush" and Dr. Knight collected the Georgia specimens on *Ilex* sp.

Leptoypha mutica Say. McAtee gives the distribution of this common species as Indiana, Ohio, Nebraska, Wisconsin, Ontario, New Jersey, Tennessee, Texas, and states as follows: ". . . very common in the vicinity of Washington, D. C., on fringe-tree (*Chionanthus virginica* L.) and on various species of ash (*Fraxinus*)." To these localities I can add Michigan, Illinois, Maryland, Virginia, Georgia and Florida. My Texas specimens bear the food plant label "*Adelia acuminata*." Heidemann collected a long series of specimens "at light" at Forest Glen, Md., June 6, 1914.

Dichocysta pictipes Champion. A single specimen of this species was taken by the author while sweeping shrubs in a hammock on the University of Florida Campus at Gainesville, Fla., June 14, 1918. It has been collected in Arizona by Prof. Barber.

Hesperotingis illinoiensis n. sp.

Head with long stout spines; median spine suberect; lateral spines porrect or approximating at their tips; dorsal spine very long, contiguous with surface of the head. Antennæ stout, reaching beyond the base of the elytra, slightly pubescent, the basal segment thicker and longer than the second; third segment long, very large, clavate, much longer than in *antennata* Parsh.; fourth segment nearly elliptical, longer than the first and shorter than the first and second segments taken together. Pronotum coarsely punctate, tricarinate, the carinæ moderately raised, rather thick, uniseriate; paranota uniseriate, nearly vertical. Bucculæ broad, reticulate. Rostrum extending to the intermediate coxæ, the rostral groove widened posteriorly. Legs moderately stout. Elytra extending considerably beyond the apex of the abdomen, broadly rounded at the apices; costal area broad, biseriate to beyond the middle and triseriate for a short distance towards the apex, the areolæ moderately large and somewhat regularly arranged; subcostal area almost entirely biseriate; discoidal area broad, extending beyond the middle of the elytra, the outer margin curved. Length, 4.1–4.6 mm.; width, 2 mm.

Color.—General color above uniform yellowish brown, slightly darkened in the type. Body beneath, legs and antennæ brown, the tarsi and the distal half of third and fourth antennal segments blackish.

Three specimens taken at Palos Park, Ill., July 16, 1908, by Mr. W. J. Gerhard. In one specimen the costal area on one side is entirely biseriate and on the other sides as described above. The type has the wings a little longer, about .5 mm., than the other two specimens and is a little darker in color. The broad costal area readily separates this insect from either *antennata* Parshley or *fuscata* Parshley.

Type in Cornell University collection; *paratype* in the author's collection, Syracuse, N. Y.

NOTES ON THE CYCHRUS FOUND IN THE BLACK MOUNTAINS, NORTH CAROLINA.

By William Beutenmuller, New York.

On my expedition to the Black Mountains in western North Carolina from May to the latter part of October, 1912, I was fortunate enough to secure a large number of specimens of the different species of *Cychrus* found in this interesting region. I obtained *Cychrus guyoti, æneicollis, andrewsi, irregularis, bicarinatus, canadensis, elevatus* and form *tenebrosus*. By good luck I located several places inhabited by the rare *C. guyoti* and collected a fine series. It is very local and is found on the extreme summit in the dense, dark, balsam forests, as well as on the slopes and base of the mountains. On the slopes it is only found in the deep ravines and at the base in coves and places where the sun never or rarely penetrates through the dense growth of vegetation. I have never found any *Cychrus* on the slopes where the same becomes parched and dry during the summer, or in sunny places. There are two forms of *guyoti*, a purplish bronze form (the type) and a black form wanting the purplish metallic luster. For this dark form I would propose the name *angelli*, after Mr. G. W. J. Angell, who is specializing in the *Cychrinii*. *Guyoti* is found from the latter part of May until late in August, but is most abundant in June and July. It evidently does not hibernate, as I have not been able to take it after August 20. *Cychrus æneicollis* is found in the same situations as *guyoti*, but is more abundant and social in habit and is most numerous on the extreme summit in the balsams (*Abies frazeri*). It is a valid species and not a form of *andrewsi* as placed by Roeschke in his monograph. There are also two forms of *æneicollis*, a metallic greenish and a purple form. I herewith propose to call the green form *æneicollis* (type form) and the purple form *purpuratus*. *Cychrus andrewsi* is the most common species and is found in mostly all the coves at the base of the mountains near streams. I have never taken it on all my trips on the extreme summit or higher parts of the slopes. It is found throughout the year and it hibernates in rotten wood and hollow trees. I have taken as many as twenty-five under bark of a single tree and on one day took as many as one hundred specimens. *Cychrus irregularis* is rare and I collected only twenty-five examples in the coves near the base of the mountains in June, July and August. I have also taken it on the summit. *Cychrus bicarinatus* is almost as common as *andrewsi* and probably also hibernates. It is found from June to late in October and is most abundant in September and October. *C. canadensis* is not common. This species prefers places close to the ground under chips of wood and under bark of small fallen trees. It is found from the base to the summit of the mountains and is most abundant in the balsams, with *æneicollis*. I collected one female of *canadensis* in the Swananoa Mountains, N. C., which differs in color from the purple Black Mountain form by being almost black with only slight traces of the purple color, and it is very likely that an entirely black form will be found when this region is explored. *Cychrus elevatus* form *tenebrosus* I obtained in open woods on the edges of the slopes and in the valley from June to October. I am fully convinced that other new forms of *Cychrus* will be found in the mountains and peaks in western North Carolina, Georgia and eastern Tennessee, especially in the Great Smoky Mountains, which have never been explored entomologically. All *Cychrus* feed on snails, which abound in the region and may be collected by the thousands. I have also found *C. andrewsi* feeding on catbriar (*Smilax*) berries which in some way got under loose bark of a fallen tree. I found almost all of my *Cychrus* under loose bark and only a few under stones.

STUDIES IN THE OLD TESTAMENT.

By R. P. Dow, Brooklyn, N. Y.

Lesser Insect Mentions.

After considering the many grasshoppers, locusts, flies, wasps, bees mentioned in the Old Testament, little text is left for the remaining dozen insects of somewhat lesser economic importance. Of the identification of the *nemalah* with the ant there can be no doubt, although observation of the creature never went so far as to recognize more than one kind. There is a Hebrew root *namah,* to cut off, and this is well exploited by Bochart, Hierozoicon. Even Zoroaster, 6400 B. C., explains how the ants cut off the end of the grain to prevent its sprouting in their burrows. The Hebrews were a patient people. There is not a single reference to the ant being troublesome by stealing grain or by any other form of piracy which is the creature's constant practice. The ant stands only for wisdom and industry. The only mentions are those in Proverbs—" Go to the ant; which having no guide, overseer, or ruler, provideth her meat in the summer, and gathereth her food in the harvest" and " Of the four things little upon earth but exceeding wise, the ants are a people not strong; yet they prepare their meat in the summer."

The flea is the Biblical *parosh,* and while we find it troublesome the Hebrews never complained. Fleas are so plentiful in the Orient that the natives almost forget their existence. King David makes the only mentions, metaphorical comparisons to himself, for elusiveness in the first place and for not being worth while in the second. He says of Saul: "The King of Israel is come out to seek a flea, as when one doth hunt a partridge in the mountains." Again, the flea is worth nothing when caught. "After whom dost thou pursue? After a dead dog, after a flea?"

In the very oldest Sanscrit much is said about the spider, but the Hebrews paid little attention to its existence or its habits. The King James version has a proverb about spiders in King's palaces, but in its translation of the word *semamith* it differs from almost every other authority. Bochart in his Hierozoicon pointed out that the word meant a lizard, the *Stellio* of the Romans, and a word in modern Arabic meaning lizard or chameleon is very similar. Hence the Revised Version abandoned the spider and substituted lizard. Perhaps the word is scientifically incorrect, but it agrees well with Omar:

> "They say the lion and the lizard keep
> Where Jampishur drank long and deep."

The Hebrew *akkabish* is surely spider. It figures only as a web-maker. Job says: "Whose hope shall be cut off, and whose trust shall be a spider's web (*i. e.*, no stronger)." Isaiah LIX. 5: "Their (spiders') webs shall not become garments" (*i. e.*, insufficiently strong).

The word *rimmah,* for which the only possible translation is "worm," is of great interest because its root is the same as the Sanscrit krims, wrimi, and the Latin vermes, all three having exactly the same signification, both true worm or wormlike larva. Micah I. 17 mentions a true worm, "they move out of their holds like worms of the earth." Exodus XVI. 20–24 reminds one irresistibly in its allegory of the edible fungi, fresh one day and the next riddled by hosts of larvæ of mycetophagous flies and beetles. "Some of them left their manna until the morning and it bred worms and stank. They laid it up (on the Sabbath) and it did not stink, neither was there any worm therein." Isaiah dwells on the worms feasting in the bodies of the dead, and in one place, LXVI. 24, forecasting a sort of Hell, "for their worm shall not die; neither shall their fire be quenched; and they shall be an abhorrence unto all flesh." Job mentions the worms "destroying this body" and "feeding sweetly upon him." The worm emblem of humility has mention by the Psalmster, XXII. 6—"But I am a worm and no man." Job is the apotheosis of humility: "Man that is a worm, and the son of man, which is a worm." "My flesh is clothed with worms and dust." "I have said to corruption, Thou art my father; to the worm, Thou art my mother, and my sister."

The *ash* of Hebrew and the *Ses* of Greek are the clothes moth, or possibly occasionally some other species having similar habit. There is no reason for stumbling over the simile of Job IV. 19 of the houses of clay whose foundation is in the dust, which are crushed before the moth. All through Job are allusions to moth-eaten garments. Isaiah combines two words, the latter surely predecessor of the Greek word: "For the *ash* shall eat them up like a garment, and the *sas* (rendered worm) shall eat them like wool." It is to be doubted whether any reason exists for trying to separate some wool-eating *Tinea* from the rest of the garment-eaters.

The word *bak* occurs several times in various Hebrew works and seems to be equivalent to the Greek *conops.* Its interest here comes from the comment of Bochart on Matthew XXIII. 24, "strain at a gnat and swallow a camel." The word *sarabim* occurs twice and was regarded by the Septuagint as referring to some *Œstrus* or other gadfly. This seems better than the King James translation, for the latter disagrees with itself. There is an insect called by the Arabs *sarran* which has the habit of the bot flies but the natives think it has a sting in its tail. Perhaps some old mythical idea of something halfway between a gadfly and a scorpion has prevailed. So far as the import of Ezekiel II. 6 is concerned it makes no difference which it be: "though briars and thorns be with thee, and thou dost dwell among scorpions." It does make a difference, however, in Hosea IV. 6: "For Israel slideth back as a backsliding heifer." Now, a heifer is not assailed by a scorpion, but it is by a gadfly.

AN UNDESCRIBED NORTH AMERICAN SPECIES OF HYDROTÆA (DIPTERA, ANTHOMYIIDÆ).

By J. R. Malloch, Urbana, Ill.

The species described herein is in the collection of the Illinois State Natural History Survey.

Hydrotaea cristata sp. n. Male.—Black, shining, with a faint bluish tinge. Thorax and abdomen with slight whitish pruinescence, the former indistinctly vittate, the latter with a very slender dorso-central dark stripe. Wings slightly brownish. Squamæ white. Knobs of halteres black.

Eyes bare, separated by less than width across posterior ocelli; arista pubescent, cheek narrow, the upper one of the upcurved bristles very strong. Thorax with the normal bristles; prealar bristle absent; presutural acrostichals consisting of 3 strong pairs. Abdomen similar to that of *houghi* Malloch, the fifth sternite slightly emarginate posteriorly. Fore femora with 5–6 long bristles on basal third of postero-ventral surface, a group of setulæ on ventral surface of same part, and 2 stout thorns before apical excavation, the inner one much shorter than the outer; fore tibia with 3 distinct excavations on ventral surface, the apical one largest; mid femora thicker at base than apex, and with a very conspicuous clump of bristles on basal fourth ventrally; anterior surface of mid tibia with closely placed erect fine hairs from base to apex, posterior surface with 3 bristles; hind femora with 7–9 bristles on apical half of antero-ventral surface; hind tibia curved, with a dense comb of short erect spinules on ventral surface at apex, 3–5 short antero-ventral bristles, an antero-dorsal fringe of short, fine hairs, and a very long bristle about one fourth from apex on postero-dorsal surface. Third and fourth veins convergent apically.

Length, 6.5 mm.

Type locality, New Bedford, Mass.

This species will run down to *dentipes* Fallen in my recently published key to the males of this genus,* but is readily separable from that and other species by the dense bristles on base of mid femora and the comb at apex of hind tibiæ.

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* Bull. Brooklyn Ent. Soc., Vol. 11, p. 108.

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BULLETIN
OF THE
BROOKLYN ENTOMOLOGICAL SOCIETY

VOL. XIII DECEMBER, 1918 No. 5

DESCRIPTIONS AND RECORDS OF SOME INTERESTING PARASITIC HYMENOPTERA MOSTLY COLLECTED BY MR. HACHIRO YUASA IN TOMPKINS COUNTY, NEW YORK.

By J. Chester Bradley, Ithaca, N. Y.*

Mr. Hachiro Yuasa has recently placed in my hands a collection of Hymenoptera captured by himself in the vicinity of Ithaca during the present season. As three of these are new and several others are interesting records, I have thought it worth while to prepare this report upon the more interesting species. Unless otherwise stated the collector is understood to be Mr. Yuasa; and locality, Ithaca.

I have also included a study of certain species of the genus Odontomerus, based only partially on Mr. Yuasa's collections.

BRACONIDÆ.

Doryctes radiatus Cresson.

Forest Home and Chicoree Wood, Ithaca, 25 June, 12 July, 1918, 2 ♀.

ICHNEUMONIDÆ.

Amblyteles anceps (Cresson). Chicoree Wood, Ithaca, 31 July, 1 ♀.

Phæogenes quadriceps Cresson.

Ithaca, Six-Mile Creek, 29 July, 1918, 1 ♂ (H. Yuasa); Spring Lake, Cayuga Co., 20 July, 1918, 3 ♂, in an open marsh (S. H. Emerson and J. C. Bradley).

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* Contribution from the Entomological Laboratory of Cornell University.

Phæogenes pimploides n. sp.

♀. Black, head and thorax somewhat shining; the front and middle legs entirely, hind coxæ, trochanters and femora except extreme apex of the last, rufous; hind tibiæ, except for a white ring near the base, and tarsi except for a white ring at base of each of first four segments, brownish black; the white ring on the posterior metatarsus occupies nearly one half of the segment; antennal segments 10–12 inclusive white, dusky on the outer side; mandibles except at base and edges, the palpi, the tegulæ, and narrow apical edge of the seventh dorsal segment, dirty white. Wings nearly hyaline, slightly stained brownish. Length 6.5 mm.

Temples moderately broad, margined posteriorly; vertex and front shining, with even but sparse small punctures; antennæ inserted on a protuberance which is rimmed below, the center of the rim with a small upward projecting tubercle; face a little more closely and coarsely punctured than the front, strongly convex, with a median raised portion; clypeus transverse, separated by a distinct but shallow groove, its disc almost impunctate, its apex rounded, with a slight median depression; mandible bidentate, the lower tooth smaller and shorter than the upper. Antennæ composed of 26 segments, moderately slender; the first segment of the flagellum shorter than the second; the latter more than twice as long as thick; the 21st segment strongly constricted on the inner side.

Mesonotum shining, punctured similarly to the front; parapsidal grooves evident only anteriorly; the median lobe between these more densely punctate, matte; scutellum only moderately convex, with a carina on each side at its base, polished and sparsely punctate; mesopleura and sternum with a strong prepectal carina, shining, punctured nearly as the front and vertex, the mesopleura with an impunctate polished tumidous area in their upper posterior region. Propodeum with a horizontal dorsal portion, merging into a strongly declivous posterior face, the angles subdendate; carinæ well marked, the petiolar area longer than broad, concave, the areola rounded anteriorly, longer than broad and emarginate behind.

Posterior coxæ with an inner subapical, papilliform tooth; the middle femora slightly, the front and hind femora strongly swollen. Claws simple. Areolet pentagonal, complete; median and submedian cells (M and $Cu + Cu_1$) of forewing of equal length; the transverse-median vein of the hind wing only slightly broken below the middle.

Post petiole strongly widened, the spiracles near the apex; its disc smooth, shining and impunctate; its extreme sides with a few grooves behind the spiracles; gastrocoeli distinct, transverse, moderately deeply impressed, distant from the base of the segment; surface of the second segment basad of these slightly irregularly rugose, apicad of the gastrocoeli matte, with small, shallow, moderately sparse punctures among which are numerous, minute, close-set punctulations; remainder of dorsum similarly sculptured, but the punctuation becoming obsolete toward the apex. Apex of abdomen acute, as in *Pterocormus*.

Ithaca, Chicoree Woods, 12 July, 1918, 1 ♀.

Holotype.—Cornell University, No. 243.1.

Phygadeuon (Stibeutes) yuasai n. sp.

♀. Black, polished and shining; the antennæ at base, palpi, and all of the legs straw-yellow; second dorsal segment somewhat pale at base, medially. Wings stained slightly, the veins and stigma pallid brownish. Length 3 mm.

Head large, one and one fourth times as wide as the thorax from tegula to tegula. Seen from above, its posterior margin is deeply concave, its length measured along the median line equal to one half of its extreme width (measured between the outer limits of the eyes), and its greatest length, on either side, three fifths of the width. Temples broad, margined posteriorly; vertex polished and impunctate; front polished and with only a trace of minute shallow punctures; face convex, separated from the small convex clypeus, the latter with rounded anterior margin; eyes remote from the mandibles, the cheeks polished and impunctate. Antennæ rather short and somewhat thickened, composed of 20 segments, the scape stout, the 3d segment a very little shorter than the fourth (about one eighth), the latter twice as long as wide at apex, the more apical segments as wide as long or wider, except the ultimate.

Mesonotum noticeably flat, polished and impunctate; parapsidal grooves indicated at antero-lateral margin; scutellum delimited, a carina on each side at base, convex, impunctate and shining; propleuræ and mesopleuræ polished and shining, impunctate, the latter with a large deep pit at some distance below the base of the hind wing; sternauli strongly impressed, becoming subobsolete at posterior margin of the segment, somewhat crenulate anteriorly; mesosternum polished but with sparse shallow punctulation, and with a deep and broad crenulate median longitudinal furrow; prepectus poorly defined laterally, but the prepectal carina prominent ventrally; metapleura smooth, impunctate, polished. Propodeum obliquely truncate posteriorly, its angles obtusely elongate, forming a fossa, impunctate smooth and shining; the areola semicircular, the basal area transverse, the carinæ well marked, the surfaces of the area shining and smooth. Posterior coxæ large, the femora and tibiæ stout, the latter somewhat constricted at base. Wings as long as the distance from the tegulæ to the apex of the petiole (nearly 1½ mm.); wing apex obtuse, the stigma large; apex of the marginal cell about midway between apex of the stigma and tip of the wing, distant from the stigma by less than the length of the latter, however; submedian cell ($Cu + Cu_1$) ending slightly beyond the median (M); second discoidal cell (M_3) small and triangular; the first recurrent vein (M_{3+4}) is absent, and the disco-cubital cell (1st $R_1 + R + M_4$) is thereby united with the 3d discoidal cell (1st M_2) and this in turn by the absence of the second recurrent and subdiscoidal veins (M_2 and m) is united with the cells around the wing margin. In the hind wings there is a closed median and submedian cell, and the transverse median vein, nervellus, is slightly broken almost in the middle.

The petiole is rather long and slender at base, gradually but strongly widened at apex; anteriorly its surface is opaque, posteriorly shining and impunctate; the gastrocœli are small, transverse, and placed at the base of the segment. the surface of the second and following dorsal segments is impunctate and shining. The ovipositor of the type specimen is completely exposed and almost as long as the first three segments of the abdomen (1 mm.), but in normal position would probably project about ⅗ of that distance, or a little more than the length of the petiole beyond the tip of the abdomen.

New York: Ithaca, Chicoree Woods, 18 July, 1918, 1♀.

Holotype.—Collection of Cornell University, No. 244.1.

Phygadeuon mellinus Provancher.

New York: Ithaca, 12, 14, 15, 21, July, 1918, 4 ♀.

Aptesis pterygia new name.

1836. *Cryptus micropterus* Say, Bost. Journ. Nat. Hist.: 1, 238.

1888. *Aptesis micropterus* Cresson, Synopsis and Catalogue of Hymenoptera of North America, p. 199.

(1815. *Not Ichneumon micropterus* Gravenhorst, Monogr. ichn. pedestr., p. 26.

1850. *Aptesis microptera* Foerster, Arch. f. naturg., 16: 89.)

One female, Chicoree Woods, Ithaca, N. Y., June, 1918.

ODONTOMERUS.

As Morley has shown, the length of the ovipositor is not at all reliable for the distinction of species, nor is size.

Say in 1828 described under the generic name *Anomalon* an *Odontomerus* with black polished body and honey-yellow legs to which he gave the name *mellipes*. Among 24 specimens before me, mostly from central New York (one male from Quebec and one female from New Jersey) all the females of which would answer to Say's description, I find three distinct species: (*a*) represented by 3 females and 2 males (one of the latter from Quebec) has the head strongly expanded behind the eyes, that is, buccate, and the eyes not so prominent as in the other two, has the extreme apex of the hind femora of the females always fuscous as well as the apex of the hind tibiæ and the entire hind tarsi. In the males the entire hind legs are fuscous, except the trochanters, which are darker above and yellow below. The other two species have the head quite broad and rounded behind the eyes but not strongly expanded; (*b*) represented by 15 ♀♀ and 3 ♂♂, evidently the common form locally at least, has in the ♀ never even a touch of fuscous on the hind femora, and the tibiæ are usually entirely yellow, but in one or two specimens are barely shaded with fuscous on part of the apex. The hind tarsi, however, are always more or less infuscated, in some cases really only a deeper duskier shade of reddish yellow. In the males of this species the entire hind tibiæ and tarsi are fuscous, their femora red except for more or less dusky along the upper margin. Species (*c*) of which I have a single ♀ from Ithaca, has the middle and hind tibiæ white, tipped with fuscous and differs from *a* and *b* in the sculpture of the petiole.

While Say may have had any of the three species *a, b* or *c,* it seems most likely that he had *b,* for the following reasons: He says "Head with the distance behind the eyes considerable," but does not mention the noticeable lateral expansion of *a,* as he would probably have done had he had that species; he describes the ovipositor as being as long as the body, and that seems the average length for *b,* while in the specimens of *a* before me it is longer; knowing both sexes, he describes the feet as honey yellow, which he would have been less likely to do without modification if he had had a male of *a.* Finally *b* seems to be much the common form and would have been the more likely to have attracted his attention.

Provancher in 1877 described *Odontomerus canadensis,* ♂ and ♀. It seems highly probable that he had one of these three species, and in all likelihood *a.* Knowing both male and female he describes them as having clear red legs, the posterior femora at tip, the tibiæ and the tarsi fuscous. Rohwer and Gahan have recently selected the ♀ as holotype, so that we may omit consideration of Provancher's male, which may be *b.* I have not seen ♀ specimens with black posterior tibiæ, but the several specimens of *a* before me have the extreme apex of the femora and apex of the tibiæ fuscous, and it would seem probable that Provancher's specimen represented an individual of *a* with more completely infuscated tibia. Finally I have a male of *a* from Quebec so that we may be certain it is regional for Provancher's species.

Cresson in 1870 described *Odontomerus vicinus* and his description corresponds to the males of *a*. I shall, therefore, until Provancher's type may be examined, consider *canadensis* a synonym of *vicinus*.

TABLE TO SPECIES OF **Odontomerus**.*

1. Abdomen red ....(2)
   Abdomen black ....(5)
2. Legs black ....(♀) *atripes* Rohwer
   Legs red ....(3)
3. Sides of propodeum finely punctured; parapsidal grooves finely, irregularly foveolate; areola of propodeum not three times as long as its basal width ....*dichrous* Rohwer
   Sides of propodeum not or obsoletely punctured; parapsidal grooves not foveolate; areola of propodeum about three times as long as its basal width ....(4)
4. Posterior femora very short and stout ....*bicolor* Cresson
   Posterior femora longer and more slender........*abdominalis* Cresson
5. Legs entirely black ....(6)
   At least the anterior four legs yellow ....(7)
6. Second and following segments of the male nearly impunctate, female with red abdomen ....(♂, ♀) *atripes* Rohwer
   Second and following segments of the male rather densely punctate; abdomen of female black ....(♂, ♀) *æthiops* Cresson
7. Carinæ of propodeum distinct ....(8)
   Carinæ of propodeum obsolete ....(♀) *alaskensis* Rohwer
8. Basal area of propodeum separated from the areola by a transverse carina ....(♀) *errans* Rohwer
   Basal area of propodeum confluent with the areola ....(9)
9. Head seen from above widely expanded behind the eyes, the occipital margin deeply concave; female with the posterior femora tipped with black and their tarsi fuscous at apex; male with the hind legs entirely fuscous (except the trochanters), with the face closely punctate all over, and with the median part of the face not much elevated ....(♂, ♀) *vicinus* Cresson
   Head, seen from above rounded or bent, slightly widened behind the eyes ....(10)
10. *Female:* Post petiole with a broad longitudinal sulcus, smooth medially and only slightly and finely roughened laterally; the base of the second segment with only a small amount of fine irregular aciculation; posterior femora not tipped with fuscous. the hind and middle

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* This table is largely compiled and intended only for what temporary usefulness it may serve to those who, like myself, have not had opportunity for a careful comparison of the types.

tibiæ unicolorous with the femora. *Male:* Face with a median closely punctate swelling, the sides of the face almost impunctate; coxæ and trochanters and at least sometimes the femora of the hind legs reddish yellow .... (♂, ♀) *mellinus Say*

11. *Female:* Post petiole without a median fossa, longitudinally but irregularly aciculate dorsally as well as laterally; second segment with a more extended basal area of irregular aciculation; hind femora tipped with fuscous; hind and middle tibiæ of a distinctly whitish hue. .... (♀) *albotibialis* n. sp.

Odontomerus albotibialis n. sp.

♀. Black, polished and shining; coxæ, trochanters and femora reddish yellow, tibiæ paler, especially the hind pair, of a distinctly whitish hue; hind tarsi and ultimate segment of others fuscous; rest of front and middle tarsi pale; apex of hind femora with a fuscous spot above; hind tibiæ tipped with fuscous. Wings nearly hyaline, slightly infumated. Length 7.5 mm., of ovipositor 12 mm.

Head seen from above transversely quadrate, not at all widened posteriorly, the occipital margin but slightly concave; vertex temples and front impunctate; face gibbous and strongly evenly punctured.

Mesonotum impunctate, polished, the parapsidal furrows deeply impressed, not crenulate. Propodeum areolated, the basal area confluent with the long and narrow areola; lateral spines prominent; segments of middle tarsi somewhat more slender than in *mellinus.*

Petiole roughened throughout; basal part of second dorsal segment irregularly roughened; rest of abdomen dorsally impunctate, shining.

Chicoree Woods, Ithaca, N. Y., 1 ♀, 12 July, 1918 (H. Yuasa). *Holotype.*—Cornell University No. 245.1.

Odontomerus abdominalis Cresson.

In several specimens of this species the posterior coxæ and trochanters are red. It may, however, be distinguished from bicolor by the shape of the femora.

New York: Ithaca, Chicoree Woods, 1 ♀, 16 Aug. '18 (H. Yuasa); Norton's Landing on Cayuga Lake, N. Y., 1 ♀, swept from foliage in woods by Mr. H. H. Smith, June 5, 1872, and determined by Mr. E. T. Cresson in about 1873 [Cornell University]. These are the only two specimens of this species that I have noted from central New York.

Odontomerus vicinus Cresson.

Quebec: St. John's Co., 28 Aug., 1901, 1 ♂ [Cornell University]. New York: 13 June, 1906, 1 ♂ [Cornell University]; 18 July, 1893, 1 ♀ [Cornell University]; 30 June, 1918, 1 ♀ (H. Yuasa) [collection of H. Yuasa].

Odontomerus mellipes Say.

Quebec: Val Morin, 19 Aug., 1 ♀ (C. J. Ouellet) [Cornell University]; New York: Ithaca, 9 July, 1904; 25 Aug., 1895; 4 July, 1900; 30 July, 1914; 31 May, 1913; 6 Aug., 1906; 12 Aug., 1914, 7 ♀ [Cornell University]; 12 Aug., 1884, 1 ♂ (J. M. Stedman) [Cornell University]; 18 June, 1918; 16 Aug., 1918, 2 ♀ (H. Yuasa) [collection H. Yuasa]; 8 June, 1914, 1 ♂ [Cornell University]; Rock City, Cattaraugus Co., 9 June, 1915, 1 ♂ [Cornell University]; Caroline to Harford, Tompkins and Tioga Counties, 15 June, 1904, 1 ♀ (A. D. MacGillivray and J. C. Bradley) [Cornell University]; Norton's Landing on Cayuga Lake, 14 Aug., 1872, 3d week in Sept., 1872, 2 ♀ (H. H. Smith) [Cornell University], these were determined as *mellipes* by E. T. Cresson in or about 1873. Ringwood, 6 July, 1918, 1 ♂ (H. Yuasa) [collection H. Yuasa]. New Jersey: Ridgewood, 21 June, 1911, 1 ♀ (M. D. Leonard) [Cornell University].

Scambus (Apechtis) annulicornis (Cresson).

Mr. Yuasa has collected a series of 22 specimens on different dates during July and August.

As Morley has pointed out this is a typical *Apechtis,* and not, as suggested by Viereck *Pimplidea* [=*Pimpla* Auct. sen. str.].

Scambus (Pimplidea) turionellæ (L.).

A large series of *tenuicornis* and of *annulipes,* collected by Mr. Yuasa, compared with European specimens of *turionellæ* convince me that Morley is correct in synonymizing them. Some specimens have forecoxæ black and tegulæ black, some forecoxæ black and tegulæ white, some forecoxæ part red and part black, some forecoxæ red and tegulæ white. The series also shows variation in the color of the posterior tarsi, these being usually all fuscous, but the metatarsus sometimes white at base.

Meniscus superbus Cresson.

Six-Mile Creek, Ithaca, 22, 23, 24, July, 1918, 22 ♀ and ♂. The color of the abdomen varies, the 3d segment being often more or less fuscous, and in one female the entire abdomen is fuscous dorsally, except the fourth and fifth segments are reddish laterally. On the other hand one male has the entire abdomen dorsally red except the first segment.

Rhyssa persuasoria L.

An interesting case of reduction of the areolet within a single species is presented by the American representatives of this holarctic form. The areolet in different individuals, especially of the form *albomaculata* becames reduced in size, petiolate, strongly petiolate, minute and triangular, and finally entirely absent (the form described by Provancher as *Epirhyssa crevieri*).

In the material collected by Mr. Yuasa there is a specimen of this last form, entirely lacking the areolet. Three others lack the lateral abdominal white spots.

Paniscus (Parabatus) latungula subspecies **deceptor** Morley.

Mr. Hachiro Yuasa has collected and given to me a female of this species, recently described from a unique Nova Scotian male. In view of the fact that the original description is by comparison with a European species which may not be familiar to American authors, I have deemed it worth while to give a description of the female here.

♀. Entirely luteous except the head which is lemon yellow except on its caudal aspect, and the posterior tarsi which are broadly paler medially. Wings hyaline, the veins pallid, the stigma yellow. Length 9 mm.

Posterior border of temples and vertex without a carina; posterior ocelli just touching the eyes, the latter emarginate; face prominent below the ocelli; apophyses obsolescent; clypeus truncate.

Mesonotum minutely punctulate; parapsidal furrows impressed, at least anteriorly; scutellum margined at base and weakly on the sides toward but not to the apex (the carinæ sharper but much weaker except at base than in *cristatus*); postscutellum not transversely cristate (as in *cristatus*). Propodeal carinæ entirely lacking, except a transverse reflexed rim surrounding the immediate base of the petiole; spiracles oval.

In the forewing the areolet is present but triangular and petiolate; the disco-cubital vein (M_{3+4} and M_{1+2}) strongly curved, arising from the discoidal very close to the subdiscoidal (*i. e.,* dividing into R_3 and R_4 very near the insertion of m), slightly broken but without real stump of a vein (M); the basal and transverse medial veins interstitial; transverse median vein of the hind wing strongly angled above the middle.

Petiole with deep lateral pits at base, otherwise without sculpture; the spiracles but little nearer to each other than they are distant from the base of the petiole and much basad of the middle. Thyridia on the basal margin of the second segment and moderately deeply impressed.

New York: Ithaca, Chicoree Woods, 14 July, 1918, 1 ♀ (H. Yuasa).

Allotype.—Cornell University No. 246.1.

Mr. Morley compares his species with the common European *cristatus,* but by virtue of the very characters in which he points out its difference from that species, it is more closely related to *latungula* Thomson. In fact, so exactly does it correspond with that species that I can consider it no other than a nearctic subspecies thereof. A comparison with European specimens of *latungula* show only two points of difference. In *latungula* s.s. the hind ocelli are appreciably but very slightly removed from the eye, while in *deceptor* they touch it; and in *latungula* the scutellum is not margined laterally except at base, while in *deceptor* it is weakly margined beyond the base; the carinæ shortly becoming obsolescent. Both differ from *cristatus* in not having the postscutellum transversely cristate, and by the lack of propodeal transcarinæ, as well as in smaller size.

TRIGONALIDÆ.

Tapigonalys pulchellus Cresson. Bool's Flat at Forest Home and Six-Mile Creek, Ithaca, 13, 21, 23, 24 July, 1918, 8♂, ♀.

ROPRONIIDÆ.

Ropronia garmani Ashmead. Six-Mile, Ithaca, 22 July, 1918, 1 ♀.

DIAPRIIDÆ.

Galesus viereckii Brues. 12 July, 1918.

Paramesius pallidipes Ashmead. 16 Aug., 1918, 2 ♂.

DRYINIDÆ.

Chelogynus henshawi Ashmead. Brookton, Tompkins County, N. Y., 28 June, 1918, 1 ♀.

NOTES ON CLERIDÆ.

By A. B. Wolcott, Chicago, Illinois, and E. A. Chapin, Washington, D. C.

In the course of preparing a synopsis of the genera of the Cleridæ of North America, it has become evident to the authors that certain names have been used wrongfully in the past and should be corrected. The more important of these changes are here made known.

Lecontella nov. gen.

Body elongate; head short, labrum transverse, slightly emarginate, terminal segment of maxillary palpi cylindrical, not tapering toward apex, terminal segment of labial palpi securiform, eyes emarginate, coarsely granulate, antennæ eleven-segmented, basal segment large, somewhat bent, segments 2–10 slightly wedge-shaped, sub-equal, segment 11 elongate, cylindro-acuminate, in the ♂ equal to segments 7–10, in ♀ equal to segments 9–10. Thorax cylindrical, without trace of lateral margin. Elytra long, parallel, suture closed, covering the abdomen. Abdomen with six ventral segments, their posterior borders coriaceous, fifth and sixth segments simple in both sexes. Legs elongate, tarsi of five segments, all distinctly visible from above, segment four the shortest, first four with lobes beneath. Claws rather long, basal portion expanded slightly to form an elongate triangular process, and with a short tooth near the middle.

Genotype: *Lecontella cancellata* Lec. (described as a *Cymatodera*).

This genus is erected to care for a species which differs widely from all other known *Cymatoderæ* in the formation of the terminal antennal segment.

The use of *cancellata* Lec. as a substitute for *brunnea* Melsh. is explained by the fact that Spinola* brought to life *brunneum,* a *nomen nudum* of Dejean. This action of Spinola's causes *brunnea* Melsh. to become a homonym and leads to its rejection.

Trichodes horni nov. nom. for **T. illustris** Horn, nec Klug, 1842.

Klug, in his monographic essay on *Cleridæ* (Abh. Berl. Acad., 1842, 333–334) gives the name *illustris* Stephen MS. to a species and gives a comparative description of it. It is unfortunate that, having been so characterized, the name must stand and that Dr. Horn's name must give way. The above name is proposed in its place.

---

* Spinola, Mon. Clérites, 1, 147–148 (1844).

Trichodes apivorus var. **borealis** nov. nom. for *T. a. interruptus* Leconte nec Klug 1842.

In the same publication Mr. Klug also proposed and described *T. apiarius* var. *interruptus,* thus causing this name to be invalid for a variety of *T. apivorus.* We would here call attention also to the fact that Dr. Kraatz, in his paper on *Trichodes* (Deutsch. Ent. Zeit., 1894, 113, 136), proposes the name *interruptus* not less than four times for varieties of species of that genus!

NEICHNEA nov. gen.

Ellipotoma Wolc., 1910, nec Spinola, 1844.

Body elongate; head short, labrum slightly transverse with a triangular emargination in front, terminal segment of maxillary palpi subcylindrical, that of labial palpi obconic, eyes acutely emarginate, finely granulate, antennæ nine-segmented, first segment large, second about equally long as broad, three to six short, triangular, compressed, 7–9 broad, and very strongly flattened, equal to twice the length of the first six segments. Thorax from above quadrate, without lateral margins. Elytra long, coarsely punctured, suture closed, covering the abdomen. Abdomen with six ventral segments. Legs long, tarsi five-segmented, fourth segment very small, segments one to three with ventral lobes. Claws with prominent basal process.

Genotype: *Neichnea laticornis* Say (described as an *Enoplium*). As it has been impossible to assign this species to any characterized genus, the above characterization has been drawn up to accommodate it.

THREE NEW NORTH AMERICAN CHLOROPIDÆ (DIPTERA).

By J. R. Malloch, Urbana, Ill.

In examining the *Chloropidæ* collected in Illinois during the last three years I found three species that possess in common a character that has not been mentioned in any work on the family accessible to me. This consists of a pair of strong bristles on the anterior margin of the thoracic dorsum, mesad of the humeri. These intrahumeral bristles are directed slightly laterad and are easily overlooked. Laterad of each bristle there is a slight depression in two of the species, which may be of a sensory nature.

In the other species the black color of the dorsum does not lend itself to such thorough examination as does the pale color of the other two, but probably the depression may be distinguishable under favorable conditions. Similar bristles are present in *Pseudohippelates* Malloch, and probably in other genera not available to me at present.

Two of the species now under consideration fall to be placed in *Botanobia* (*Oscinis* auct.), while the other is referable to *Madiza* (*Siphonella* auct.). I consider the presence of the bristles does not have sufficient importance to warrant the erection of a new genus for the species.

Botanobia (Oscinis) bispina sp. n.

Male and Female.—Black, obscured by dense grayish pruinescence. Head yellowish testaceous, front portion of frons slightly ferruginous, ocellar triangle and back of head dark gray, the former slightly shining; antennæ yellow, third joint, except at base and below, infuscated; proboscis fuscous; palpi pale yellow. Thorax slightly shining, gray pruinose except on anterior declivitous portion, and lower half of pleura. Abdomen slightly shining, yellowish on basal two segments and venter. Legs yellow, fore coxæ, all of femora except bases, and a broad band on basal half of hind tibiæ fuscous. Wings clear. Halteres white.

Frons slightly over one third the head width; triangle as wide as vertex, extending slightly beyond middle of frons; orbits each with about 6 setulose hairs; interfrontalia with weak hairs; antennæ large, third joint rounded at apex; arista pubescent; cheek about one fourth as high as eye, not produced anteriorly; vibrissa weak. Mesonotum sparsely haired, smooth and impunctate; the two large intrahumeral bristles directed laterad; no intermediate prescutellars present; scutellum convex, rounded in outline, with 2 long apical bristles and 2 short lateral hairs on margin, disc with a few short setulæ. Wings and legs similar to those of *coxendix* Fitch. Length 1 mm.

Type locality, Urbana, Ill., September 20, 1916. A pair taken in copulo. In general color and habitus closely resembles *coxendix* Fitch, but that species lacks the anterior thoracic bristles.

Botanobia (Oscinis) spiniger sp. n.

Female.—Yellow, subopaque. Back of head except on lower fourth gray; triangle grayish on center; third antennal joint black except below; arista black. Disc of mesonotum fuscous on posterior half, the dark color carried more or less distinctly forward in narrow lines, so as to give the disc the appearance of having 4 short yellow vittæ; scutellum fuscous on disc; pleura entirely pale. Dorsum of abdomen largely fuscous. Legs yellow, fore tarsi fuscous. Wings clear. Halteres pale.

Head as in the preceding species, but the third antennal joint is larger, and there are 1–2 strong, black bristles on upper half of occiput in addition to the weak hairs. Mesonotum with rather sparse setulæ, which are arranged in straight longitudinal series; intrahumeral bristles large and strong, directed almost straight laterad; scutellum slightly flattened on disc, broad, rounded in outline, disc with a few hairs, margin with 4 bristles and 2 weak anterior hairs. Legs as in *coxendix*. Third costal division about three fourths as long as second; veins 3 and 4 slightly diverging on entire length of their apical sections.

Length 2 mm.

Type locality, Urbana, Ill., June 23, 1916, Augerville woods.

Paratype, Meredosia, Ill., August 20, 1917.

Resembles in general color and habitus *minor* Adams, but readily distinguishable by the anterior thoracic and the postocular bristles.

Madiza (Siphonella) setulosa sp. n.

Male and Female.—Black, glossy. Head black, triangle glossy; interfrontalia brownish fuscous, becoming reddish on anterior margin; antennæ reddish brown, greater portion of third joint infuscated; arista black; cheeks black, narrowly whitish pruinescent above; proboscis glossy black; palpi yellow. Thorax and dorsum of abdomen entirely glossy black, the latter yellowish on venter. Legs black, extreme apices of femora, bases and apices of mid and hind tibiæ, entire fore tibiæ, and all tarsi yellow. Wings clear. Halteres with yellow knobs.

Frons slightly over one third as wide as head; triangle extending beyond middle of frons, fringed with hairs on margins; interfrontalia with sparse setulæ; orbital setulæ short and stout; eyes very short haired; antennæ of average size, third joint rounded at apex; arista with very short pubescence; cheek linear, produced anteriorly; vibrissæ weak; proboscis long, geniculated at middle. Mesonotum rather densely setulose; disc with a linear median depression and a broad submedian furrow on each side, between which there are 3–4 rather irregular series of setulæ; intrahumeral bristles strong, directed backward and outward; scutellum as in the preceding species, but somewhat larger, with more discal setulæ, and with 2 strong, approximated apical bristles and 4 much shorter lateral bristles. Mesopleura bare, glossy. Third and fourth veins parallel apically. Length 1.5–2 mm.

Type locality, Freeport, Ill., July 4, 1917.

Paratypes, Mahomet, October 10, 1915; Urbana, June 11, 1917; St. Joseph, June 9, 1915; Princeton, June 24, 1915; Freeport, July 2, 1917; and Elizabeth, July 7, 1917, all in Illinois.

This species runs down to *neglecta* Becker in Becker's key to the North American species of *Siphonella,* but the cheeks are much narrower than in that species, and the anterior thoracic bristles are absent in *neglecta.*

Professor Aldrich had identified specimens of this species in his collection as *æqua* Becker, but on receiving specimens of *æqua* from him I noticed that there were no intrahumeral bristles on any of them and on my drawing his attention to the fact he informed me that though he had specimens that did have the bristles and were the same as those I have now described the type specimen of Becker's *æqua* from Idaho, which he possesses, does not have the bristles. He further informs me that he has one specimen returned to him by Becker with the manuscript name *misera* which is the same as *setulosa.*

INTERESTING NEW SPECIES OF MIRIDÆ FROM THE UNITED STATES, WITH A NOTE ON ORTHOCEPHALUS MUTABILIS (FALLEN) (HEMIP. MIRIDÆ).*

By Harry H. Knight, Ithaca, New York.

Heterocordylus acaciæ new species.

Very similar in general form to *malinus* but smaller, black with the hind femora coral red.

♂. Length 5.2 mm., width 1.7 mm. Shape of head, antennæ, and the vestiture of fine yellowish pubescence intermixed with deciduous white tomentose pubescence, very similar to that of *malinus;* black, hind femora coral red with tips fuscous, the basalar plate reddish; genital claspers distinctive of the species, the right clasper long and slender, curved, thus differing from the short and broad right clasper of *malinus.*

♀. Very similar to the male, slightly more robust.

This interesting new species was found breeding on *Acacia constricta* and a white flowering *Acacia* (probably *A. farnesiana*), it being more numerous on the latter plant. The nymphs are very similar to those of *malinus,* having the blackish hind femora, but in size smaller. At the time of collecting, July 7, the nymphs were quite as abundant as the adults. Most of the specimens were collected at a point along the highway among rolling hills, about twenty miles northeast of Valentine, Texas. That part of the country had received recent rains which brought out the plants and insects, a condition not true of most parts of Texas in 1917.

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* Contribution from the Department of Entomology of Cornell University.

Holotype: ♂. July 17, 1917, twenty miles out from Valentine, Texas (H. H. Knight); Cornell University Collection.

Allotype: Taken with the type.

Paratypes: 21 ♂♂, 10 ♀♀, taken with the types, also 4 nymphs.

Coquillettia balli new species.

Much smaller than *insignis,* pronotum shorter and broader, collum short, head more vertical, vertex broader and rostrum longer; dark fuscous brown, basal half of the corium and base of the cuneus white, thus somewhat resembling *insignis.*

♂. Length 4.2 mm., width 1.17 mm. *Head:* Width .75 mm., vertex .40 mm., length .34 mm., height from vertex to tip of tylus .77 mm.; eyes small, ovate, height .37 mm., width .23 mm., fuscous brown, more reddish on the lower half of the face. Rostrum, length 1.28 mm., reaching nearly to the posterior margin of the hind coxæ, chestnut brown, more reddish at the base.

Antennæ: Segment I, length .22 mm.; II, 1.06 mm.; III, .97 mm.; IV, .65 mm.; uniformly dark fuscous brown, minute pubescent.

Pronotum: Length .57 mm., width at base 1.08 mm., collar .48 mm.; basal margin sinuate and rounded at the corners, lateral margins rounded, slightly flaring at the basal angles, disk much flatter than in *insignis,* collar and calli not clearly defined; dark fuscous brown, more reddish on the sides. Scutellum slightly darker than disk of pronotum, shaped much like *insignis* but the mesoscutum longitudinally impressed at the middle and widening to a triangular impressed area at the base of the scutellum; sternum dark chestnut brown, shining, metasternal orifice white.

Hemelytra: Greatest width (1.17 mm.) at the base; corium white at the base, clavus and apical half of the corium dark fuscous brown, cuneus dark fuscous, basal third white and extending forward along the membrane to the inner apical angles of the corium; sparsely and minutely pubescent; membrane uniformly shaded with dark fuscous.

Legs: Dark fuscous brown to chestnut, the front coxæ and femora more yellowish.

Venter: Dark chestnut, much narrowed toward the base, apical margin of the third segment more or less pale.

♀. Length 3 mm., wingless, very ant-like in form, dark fuscous brown to chestnut; tergites of the first and second abdominal segments compressed, whitish and margined with reddish, the third segment pale on the apical margin of the ventral side.

Head: Large, conical, shaped much like that of the male; width .85 mm., vertex .51 mm., length .45 mm., height from vertex to tip of tylus 1 mm.. eyes small, ovate, height .40 mm., width .23 mm.; lower part of the face thicker than in the male. Rostrum, length 1.48 mm., attaining the posterior margin of the hind coxæ.

Antennæ: Segment I, length .25 mm.; II, .94 mm.; III, .80 mm.; IV, missing; dark chestnut brown, third segment equally thick as the second.

Pronotum: Length .63 mm., width .71 mm., widest at the middle, nearly cylindrical, disk tending to be globose and twice indented at the center, posterior margin curved forward at the middle, collar poorly defined, calli absent. Scutellum scarcely defined, no indication of wings, thorax dark chestnut brown, metasternal orifice white.

Legs: Dark fuscous brown, tibiæ darker.

Venter: Dark chestnut brown to blackish; globose, constricted at the second segment, tergite of the first segment arched, indented transversely, cream colored and margined with reddish; posterior half of the second tergite and posterior margin of the third sternite and pleurite, pale to cream colored.

Holotype: ♀, June 17, 1900, Lamar, Colorado (E. D. Ball); Cornell University Collection.

Allotype: Taken with the type.

Paratypes: ♀ topotypic; other specimens taken with the types by Dr. E. D. Ball.

The species is named in honor of Dr. E. D. Ball who has perhaps collected and observed more of the ant mimic Miridæ than any other worker.

Parthenicus aridus new species.

Large for *Parthenicus,* pale ash gray marked with black, sericeous tomentose silvery pubescence intermingled with fine golden hairs.

♂. Length 3.9 mm., width 1.37 mm. Head shaped very similar to that of *vaccini,* tylus more prominent and strongly indented at the base; rostrum reaching nearly to the middle of the venter. Antennæ pale, the second segment annulated with black near the base and again at the middle; first segment with a transverse mark across the upper side slightly beyond the middle and two spots nearer the base, black. Entire dorsum sparsely freckled with obscure reddish and a few larger fuscous spots, some black tomentose pubescence across the tip of the embolium and corium; membrane pale, irregularly flecked with fuscous, a larger fuscous spot just beyond the apex of the cuneus. Posterior femora broad, saltatorial, closely speckled with black, more densely and with larger spots on the apical half; under sides of the front and middle femora speckled with black, tibiæ with five spots and the posterior pair with seven black spots. Arolia erect, linear and converging at the apices; genital claspers distinctive, large and prominent, the left clasper with a broad flattened incurved chitinous hook, right clasper having a right angled hook with twisted acuminate tip.

Holotype: ♂, July 12, 1917, Deming, New Mexico (H. H. Knight); Cornell University Collection.

Paratypes: 33 ♂♂, taken with the types; 5 ♂♂, July 11, 1917, Mesilla Park, New Mexico (H. H. Knight).

Collected on the tent trap light, only males being taken, indicating that the females are probably brachypterous. This species was taken in company with *Argyrocoris scurrilis* V. D., which was abundant, and *Sericophanes triangularis* Kngt. at a camp seven miles out from Deming.

Parthenicus juniperi Heid. (*Psallus*) Heidemann, Jour. N. Y. Ent. Soc., xiii, p. 49, 1905.

The writer has seen the type of this species and has later studied type material and finds it to belong in the genus *Parthenicus* Reuter. The arolia are free and converging at their apices which places the species in the subfamily Orthotylinæ, other characters obviously placing it in the genus *Parthenicus*.

Dichrooscytus elegans var. **viridicans** new variety.

Very similar in structure to *elegans,* but bright green in color, the pubescence on the pronotum blackish and more conspicuous.

♀. Length 3.3 mm., width 1.4 mm. Bright green, the head, coxæ and femora often turning pale to brownish; pronotum and scutellum sometimes more yellowish green; cuneus green with margins of the apical half reddish; membrane fuscous, cell veins sometimes reddish.

Holotype: ♀, July 15, White Plains, New York (J. R. de la Torre-Bueno), Cornell University Collection.

Paratypes: ♀, July 24, White Plains, New York, also other specimens taken on cedar by Mr. Torre-Bueno. ♀, July 24, 1902, Lloyds Neck, Long Island, New York (Wm. T. Davis). 3 ♀♀ Franconia, New Hampshire (Mrs. A. T. Slosson).

The writer has taken *Dichrooscytus elegans* Uhler abundantly on white cedar (*Thuja occidentalis* L.) at Batavia, New York, and on red cedar (*Juniperus virginiana*) at Portage, New York, but did not take any forms that could be called *viridicans*. This form may be a good species but in the absence of any definite structures for separation from *elegans* the writer hesitates in giving it specific rank.

Dichrooscytus speciosus var. **rubropallidus** new variety.

Structurally not distinguishable from *speciosus* V. D., but differing greatly in general appearance; dark fuscous red marked with pale or white.

♂. Length 4.8 mm., width 1.94 mm. Front of the head white, lower half of face fuscous, more reddish on the loræ, dark spot each side between the eyes just in front of the declivitous vertex, usually eight bright red lines radiating out on each side of the median line of the front; rostrum dark red; antennæ dark yellowish, the first segment fuscous; eyes dark brown. Scutellum, sides of pronotum and transversely across the disk, epimeron of the mesothorax, coxæ, tibiæ, inner margin of the corium and along the claval suture, corium, exterior of the cubitus except across the apex, and inner half of the cuneus, pale to white. Sternum, episternum and venter, dark fuscous red, shining; femora bright reddish.

Female very similar to the male in coloration but with some pale appearing on the sides of the venter.

Holotype: ♂, June 7–17, 1916, Jemez Spring, New Mexico, altitude 6,400 feet (John Woodgate); Cornell University Collection.

Allotype: Taken with the type.

Paratypes: 2 ♂♂, 2 ♀♀, taken with the types.

Opisthuria clandestina var. **dorsalis** new variety.

Differs from *clandestina* V. D. in that the scutellum and disk of the pronotum is black.

Length 7.1 mm., width 2.8 mm. Black, base of head, juga, loræ, genæ, sides of pronotum, median vitta on basal half of the scutellum sides of pronotum, bases of middle and posterior femora, venter except the genital segment, orange.

Holotype: ♂, Aug. 26, Hanging Rock, Ohio (C. J. Drake); Cornell University Collection.

Allotype: Taken with the type.

Opisthuria clandestina var. **ventralis** new variety.

Similar to *dorsalis* except the venter is fuscous to black, the orange coloring being replaced by yellowish to pale.

Holotype: ♂, Polk County, Wisconsin, Cornell University Collection.

Paratype: ♂, July 9, 1915, Ithaca, New York (W. A. Hoffman).

Orthocephalus mutabilis (Fallen).

The writer took 10 ♂♂, 6 ♀♀ macropterous, 31 ♀♀ short-winged, June 16, 1918, Ithaca, New York, also 2 ♂♂, 21 ♀♀ on June 19 at the same spot. This interesting species was accidentally discovered while the writer was picking wild strawberries, it being found breeding on the ox-eye daisy (*Chrysanthemum leucanthemum* L.) about seven miles west of Ithaca on the Mecklenburg road at an altitude of 1,200 feet. The specimens were quite numerous within a limited area, the leaves of the host plant showing plainly the work of the bugs. The species doubtless breeds on the same plant in Europe and could easily have been introduced to this country through the accidental importation of egg-infested plant stems used for packing or in hay. This European species was first recognized from two specimens taken at Orono, Maine, by Dr. C. W. Woods in 1913, and since that time no other specimens were known from America until the present find. Collecting on daisies in other regions may show the species to have a wider distribution than was expected.

NOTES ON PLEOCOMA (II).

By A. C. Davis, Pasadena, Calif.

This season has not been a good one for *Pleocoma,* because the rains did not begin till February and were few and light at first. *Pleocoma badia* had not been taken since 1914, so I determined to get some more of them this spring. On the 27th of January my father and I went up the Mt. Wilson trail to the place where the beetles were first found, at about 3,500 feet elevation. I had never dug for them, and did not know much about collecting them, so I was prepared to dig down two or three feet. We looked for their holes as we walked up the trail, and finally came upon three. They were about three fourths of an inch in diameter. I dug in the first hole, and ran my trowel into a large female about six inches below the surface. After that I was more careful with the trowel. We continued the search, and when we started home we had three females and two males safely bottled.

On the 7th of February I went up to the same place by way of Bailey Cañon, the type locality of *Pleocoma australis*. There was one hole of this species in the soft dirt at the side of the trail, but it was empty. I did not see another hole. This species must have a very limited distribution. On the Mt. Wilson trail I found one fine female of *P. badia*. Besides the specimens which I took Mr. Fall and Mr. Martin took between them six females and one male. Mr. Fall also dug out a larva from the bank at the side of the trail. The females of *Pleocoma* sometimes leave their burrows to dig new ones. The burrows from which they first emerge are clean and round, with no dirt thrown up, and extend straight down for at least fifteen inches and probably deeper. Those which they dig after leaving their first burrow are about four inches deep and covered with dirt in a little heap. Probably the beetles do their traveling at night. The males I took were half frozen and very quiet, but the females were very lively, and I kept a couple of them alive for a short time.

When I got home I let them dig. They work their front legs as if they were swimming, the toothed tibiæ pushing the dirt back, and the head and thorax are moved rapidly, up and down, packing the sides of the burrow solidly. When I turned the beetles on their backs they were helpless. They could not turn over. Their wings are tiny stubs and they seem unable to move either the wings or the elytra except to pull them tight to the body. I had heard that Scarabaeidæ smelled with the antennæ, so I got all the strong smelling things I could think of, such as acetic acid, vinegar, ether, chloroform, etc.; to all of these the beetles paid no attention until the antennæ were actually touched, and then they frantically tried to rub the antennæ clean with the forelegs.

The eggs have not been found, but one female which I dissected contained about fifty. They are light yellow, oval, about one mm. long.

The larva did not seem to differ much from Osten Sacken's description.

These beetles are very local, only having been collected in a place about one half mile in diameter on Mt. Wilson. I have found some elytra of *P. badia* in the feces of some kind of animal on the north side of Strawberry Peak, about six miles in a straight line from Mt. Wilson, but the animal may have got them from Mt. Wilson.

The chipmunks and squirrels eat hundreds of the beetles. They must go out in the rain to dig them from their holes.

TWO NEW CYNIPIDÆ.

By William Beutenmüller, New York.

Cynips weldi sp. nov.

Female: Head black, surface microscopically crackled with numerous large, deep punctures and covered with whitish hairs. *Antennæ* 14-jointed, clavate and pubescent. *Thorax* black, somewhat shining, surface microscopically crackled with numerous large, pit-like punctures and rather densely covered with whitish hairs. Parapsidal grooves continuous, broadest at the scutellum and very fine forwardly. They are widely separated at the scutellum and curved inwardly before they reach the collar. Median groove wanting, only very slightly indicated at the scutellum. Anterior parallel lines very fine and scarcely extending to the middle of the pronotum. Lateral grooves rather long, running well forward to beyond the middle of the thorax. *Pleuræ* rugoso-punctate, opaque. *Scutellum* black, finely rugose with pit-like punctures, basal fovea large, deep and shining. *Abdomen* black or piceous, glossy with dense whitish hairs at the sides. *Legs* black or piceous, with whitish hairs, femora with large punctures. *Wings* hyaline, radial area closed. Cubitus faint and not continuous. Areolet large. *Length* 3–4 mm.

Gall: On the underside of the petiole of the leaf of white oak (*Quercus alba*) at the junction of the leaf blade, July to October. A rounded ball-like cluster of bright red or brownish galls closely pressed together and out of shape. The individual gall is rounded or tuberculated on the summit, flattened at the sides and pointed at the place of attachment. It is solid when fresh with a single barely visible larval chamber in the center. Late in September and in October the galls become detached, drop to the ground and the larvæ continue to feed therein. The gall gradually changes its shape and becomes subtriangular or polyhedral and may be taken for that of another species. The outer shell becomes thin, soft, darker in color, and the inner part is eaten away until only a hard and woody shell remains. Diameter of clusters 8–20 mm. Individual galls 5–10 mm.

Ithaca, New York (J. C. Bradley); Glencoe, Illinois (Lewis H. Weld); Boston, Mass. (Cora H. Clarke); New York and New Jersey (W. B.).

The late Miss Cora H. Clarke sent me a lot of the galls of this species collected late in September, 1914, which did not produce adults before March (indoor), 1916, and Mr. Weld has had adults issue the second, third and fourth years. It is allied to *C. nigrescens.*

Neuroterus pacificus sp. nov.

Neuroterus batatus Fullaway, Ann. Ent. Soc. Am., Vol. IV, 1911, p. 334.

The species described by David T. Fullaway as *Neuroterus batatus* Fitch from California on *Quercus lobata* is not this species and I propose for it the name *Neuroterus pacificus.* Dr. Isabel McCracken kindly sent me some of Fullaway's material as well as some collected by herself and Miss Dorothy B. Egbert. The galls occur on *Quercus lobata, Q. kelloggi* and *Q. douglasi.* The species is double brooded and the early summer galls are on the under sides of the leaves and the late summer galls are hard, woody swellings on the terminal twigs, containing numerous long, oval larval cells imbedded in the soft spongy interior of the gall.

NOTES ON SOME CICADELLINÆ IN THE UNITED STATES NATIONAL MUSEUM, WASHINGTON, D. C.

By Chris. E. Olsen, Maspeth, L. I., N. Y.

Through the kindness of Mr. Edmund H. Gibson, the writer has had the privilege of examining a miscellaneous lot of *Cicadellinæ* from the collection of the United States National Museum, Washington, D. C. Among this material were many interesting captures, with records worthy of mention, some for their corroboration of rare records, others for extension of the present known range of distribution, still others because of their taxonomical notes and a few on account of notes on habits. There is at the least one addition to the list of North American species north of Mexico. Much of the material is from the Uhler Collection, a good deal came from the Fitch Collection, the rest are from various sources.

Kolla geometrica (Signoret). A specimen bearing the label "Forest Gln. Md. VIII. 14. 15., O. Heidemann." This is a rather northern but definite record for the species; it confirms other northern mentions from Illinois, District of Columbia and Ohio (C. F. Baker, 1898, and E. D. Ball, 1901).

Kolla similis (Walker). One specimen with the label "Mo. C. V. Riley." This species is rarely found as far north as Missouri. It is distinctly a southern species common in the West Indies, Central America and reported as found in some of the Gulf States. Unfortunately the data on this specimen are rather meager.

Graphocephala coccinia (Forst). Among a great lot of specimens there were three from the Fitch Collection which bore the following labels: (1) "*Proconia sambuci*"; (2) "*P. samb. b. punctata*"; (3) "*P. samb. d. confluenta.*" These labels would indicate that Dr. Fitch (if applied by him) intended to separate out some color varieties, but the use of the name *sambuci* is rather curious, as he refers to this species in his Catalogue of New York State Cabinet of Natural History under the name *Proconia quadrivittata* Say, as described by Thomas Say in 1831 and known as such for a good many years. The differences between the three specimens are as follows: (1) "*Proconia sambuci.*" Pronotum with a broad anterior band of light yellowish-green, marked with a pair of red blotches, disk of pronotum dark-green to the posterior margin with a pair of red spots about the size of the eyes; (2) "*P. samb.* var. *b. punctata.*" With the red spots in the dark-green disk of pronotum much smaller, less than half the size of the eyes; (3) "*P. samb.* var. *d. confluenta,*" with the red blotches in the anterior light band and the spots in the dark-green disk fusing, leaving a dark-green posterior band with a center bar pointing forward and a pair of lateral bars pointing obliquely forward and inward from the postero-lateral margins. Perhaps other varieties had been designated for the letters *a* and *c* at least?

Sixteen specimens from North Carolina, July 14, 1899, Kuwana, on *Rhododendron maximum*. These specimens appear quite different from our usual brilliantly colored forms. In place of the red and green they are yellowish-brown to dark velvety brown; only one specimen shows a slight trace of green. It would strongly suggest a color variety, but fresh material would be desired to ascertain this.

Dræculacephala balli Van Duzee. Many specimens from Opelousas, La., no date, G. R. Pilate; one specimen from Selma, Ala., Aug. 28, 1910, E. A. Schwartz, with the notation "Sucking Cotton Leaves." This is the first remark suggesting a food habit of this species.

Dræculacephala acuta?? (Walker). Several specimens from Phoenix, Ariz., and Texas that somewhat fit Walker's description.

Dræculacephala bradleyi Van Duzee. From Duval Co., Fla., no date and collector given. And one specimen labeled "Beauf., N. C." (undoubtedly abbreviation for Beaufort, North Carolina). This record quite extends the range of distribution northward, as it was reported previously only from Florida and southern Georgia.

Dræculacephala novæboracensis (Fitch). One specimen with a label marked "*Diedrocephala noveboracensis* N. Y. Fitch 'Type,'" and below on another label repeated the above with additional note "Det Uhler" a small label with the number "2032" written in black ink with a red line above and below. I have been informed by the New York State Museum that they possess, among a series of types arranged by Dr. Fitch in 1850, a specimen labeled "*Aulacizes novæboracensis,* number 752, female." This is without doubt the true type and the United States National Museum specimen is not a type.

Dræculacephala sagittifera (Uhler). From Brownsville, Texas, May 1, 1904, H. S. Barber, and Victoria, Texas, July 25, 1902, W. E. Hinds. These are the first records of this species occurring north of Mexico; it is not uncommon in the West Indies. Uhler's description is from specimens from St. Vincent, W. I. Some specimens from El Centro, California, Aug. 15, 1916, F. A. McGregor, are rather uncertain, but for want of better material they may be placed under the above species.

The genus *Cicadella* will be reported in a separate paper.

THE PRONUNCIATION OF INSECT NAMES.

By C. W. Woodward, Berkeley, Cal.

The very able discussion by Professor Melander* of the principles involved in the correct pronunciation of scientific names fails to give rules to meet the very frequent cases where the derivation of a word is unknown as is true for most of us for the major part of the names we habitually use, to say nothing of the host of names we occasionally meet.

It is probably true as he intimates that we are in this country the most erratic in this respect, and I want to protest against the idea that he favors of considering that scientific Latin is correctly pronounced one way in one country and in a different but equally correct way in another, especially since he advocates for America a pronunciation no longer permitted by the Latin departments of our high schools and universities.

When the information is at hand as in the case of the large number of words brought together by Professor Melander, we should pronounce the words in the manner approved by the authorities on Latin. Those of us who are older and who have habits of mispronunciation so fixed that we cannot change surely should urge the coming generations of entomologists to start right.

There are two tendencies in our language that make it difficult to correctly pronounce Latin words.

One is the variety of the phonetic value of our vowels and our inconsistent coupling of sounds, *a, e* and *i* long having no relation with what we commonly designate as the corresponding short sounds. The English short *a,* which does not occur at all in Latin, is not infrequently heard and *y* may be given the value in the English word *by* and many other analogies with English words result in grotesque and surprising disguises of the Latin words.

The other tendency is our habitual suppresion of unaccented vowels. When the accent is correctly placed the sound of the word is not seriously interfered with. It is only because of this tendency of English speech that the placing of the accent is highly important.

---

* Bulletin of the Brooklyn Entomological Society, Vol. XI, No. 5, December, 1916, pages 93–102.

Representing the unaccented vowels by dots the common pronunciation of *Carabus, Carabidæ* and *Carabinæ* is respectively *Car. b. s., C. rab. d., C. r. bin.,* words which to the ear have very little in common while in the true Latin pronunciation with all vowels given their true sound the difference is more comparable with the difference between *sin, sinner, sinned* or *sinning.*

As a practical suggestion to cover that great class of words whose derivation we do not know, the careful avoidance of these two tendencies will result in a pronunciation very close to the correct one and a word completely intelligible to anyone, even those who are used to an incorrect placing and exaggeration of the accent.

The vowels may be all pronounced as in the English words *what, they, machine, tho* and *rue,* the *y* being a shortened *i,* and do not exaggerate the accent but give the penultimate and antepenultimate syllable approximately equal stress.

This suggestion is simply intended to enable the user of unknown Latin words to avoid the prevalent gross errors of pronunciation in those cases where the precise pronunciation is unknown and reduces the possible error to the minimum.

Field Book of Insects, with special reference to those of northeastern United States, aiming to answer common questions. By Frank E. Lutz, Ph.D., associate curator, Department of Invertebrate Zoölogy, American Museum of Natural History. With about 800 illustrations, many in color. G. P. Putnam's Sons. $2.50.

Sooner or later, every entomologist, amateur or professional, is asked by some inquirer for the name of the one book which will tell him what he wants to know in a general way about the insects likely to be seen on a summer afternoon's walk. This question has never had a satisfactory answer, for those books interestingly written were either so inaccurate or so sketchy as to be of very little use; and those which were fuller and more accurate were far too technical and special for the lay inquirer. Now, all of us can answer that question to the satisfaction of all concerned—of the inquirer, because he gets something really useful as well as interesting; of the informant, because he knows he has put another on the way to the enjoyment of our pleasant science; and of Dr. Lutz, because he has another tangible evidence of appreciation. The reason for this new book is thus set forth by Dr. Lutz himself in his introduction: "Ten years ago I felt sure that there was little excuse for additional general entomologies. The market seemed full of popular and unpopular books, each apparently attempting the impossible—the covering of a boundless field. Since then a hundred, or more, new works on the subject have appeared and lo! here is still another because, in the meantime, it has been my privilege to come in rather close contact with the laity, having been the official answerer of all sorts of questions from 'How much is a moth worth?' to 'Why are bedbugs?' I take this opportunity of taking up some of the intermediate points."

He touches briefly yet informingly on taxonomy, anatomy, collecting, mounting, keys, and insecticides, and then goes into the various classes and lower groups. In all some 1,400 species are mentioned and 500 figured. The figures are by Mrs. E. L. Beutenmüller, a guarantee of excellence and exactness. Keys are scattered through where necessary. A habitat and plant index and an entomological index complete this handy, useful little volume. Its size makes it very convenient to carry in a side pocket. May it succeed in inspiring a multitude of true amateurs such as other lands rejoice in!

J. R. T.-B.

With deep regret we announce that his failing health has compelled our Editor, Mr. R. P. Dow, to give up his labors on this BULLETIN in order to take a much needed rest. The editorship will be in my care until further notice.

In the meantime we bespeak for our publication under its new auspices the same cordial and friendly coöperation it has had from its many friends, its contributors, its readers, and not least from members of the Brooklyn Entomological Society, whose mouthpiece it is.

J. R. DE LA TORRE-BUENO.

Owing to the change in editorship, the Title Page and Index will appear with the February number.

Note to Subscribers.—By ruling of the War Board, publications are not permitted to be sent to subscribers in arrears. We ask that all renewals be in by February 1, 1919, if possible.

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Meetings are held on the second Thursday after the first Tuesday of each month from October to June inclusive, at the Central Museum, Eastern Parkway and Washington Ave., Brooklyn. The annual dues are $2.00.

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OF THE

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MAR 5 1919

BULLETIN
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Vol. XIV FEBRUARY, 1919 No. 1

RELATION OF THE SYSTEMATIST TO THE ECONOMIC WORKER.

By Edmund H. Gibson, Washington, D. C.

If in the furtherance of that branch of science called entomology the work of either the systematist or of the economist was agreed to be inferior to the other in importance there would be no object for this short treatise upon the relation of the one to the other. During the past five years I have heard frequently the mistaken statement made by economic workers that the systematist feels that the field men are his tools to supply material and to aid in the necessary biological studies, because he holds that the classification or reclassification of particular groups is the major part of entomology. On the other hand, especially among inexperienced economic workers, the opinion is often expressed that the identification of specimens is the only excuse for having systematists.

Conditions of to-day in every branch of activity prove that the successful prosecution of any endeavor is directly dependent upon all factors that enter into the problem or propaganda. The great war illustrates that no unit of force can act independently. Especially is this a truth in entomology. The economic workers or the combatant force in the unending fight upon insect pests must look to the strictly biological and systematic workers for the essentials that they alone can supply.

At this time, however, it must be admitted that the results of the economic workers are of greater importance to the world than those of the purely systematic, although it is at no time to be admitted that the work of either is of greater import to the furtherance of the subject of entomology. It is therefore essential that the systematist lend all the assistance he possibly can to those in the field who are carrying on control measures. And indeed this assistance can count for much.

Allow me to point out a few ways in which this can be done. First, by the prompt determination of specimens sent in by the field men, and a return of the specimens whenever possible. Second, by supplying needed references and complete bibliographies of insects that are being studied. There is much in the library of nearly all systematists that would be of great value to economic workers and could easily be made available by a little more willingness on the part of both to co-operate. Third, by limiting for the time being his monographic work to groups that are of economic importance.

In return for these helps the economic worker should be willing to supply full data and as much as he can when submitting specimens for identification and then have a reasonable amount of patience in waiting for the determinations.

In the way of constructive criticism I venture to say that the foundation of any misunderstandings between these two groups of entomologists lies in the ignorance that one may have of the other's work. There are many, especially young entomologists, who have absolutely no taxonomic knowledge of a single group of insects,—even some who have been in entomology for years who would come in this class. Then too there are men who from time to time attempt a piece of systematic work and who go to the field only to collect and never even inquire into the activities of the biological or economic worker.

This condition however prevalent it may seem to be should and could be eliminated by requiring young men, starting in the profession of entomology, to choose some small and well defined group of insects for taxonomic study and also by requiring the young men contemplating systematic work to spend the greater part of at least two years doing biological and economic field work.

For the future advancement of entomology, workers in a particular branch of the subject must have a better appreciation of the problems of the other branches.

While the world to-day looks primarily to the economic worker it must not be overlooked that the development of entomology depends also upon the strictly biologic and systematic workers. The whole is made up of its parts.

PAPILIO CRESPHONTES, VAR. MAXWELLI, NOV.

By George Franck, St. Petersburg, Fla.

The triangular spot near the apex of the primaries is entirely filled out with sulphur yellow, giving the specimen a striking tropical appearance.

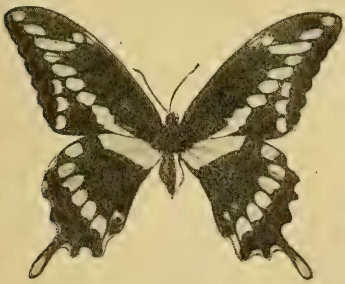

Fig. 1. *P. cresphontes.*

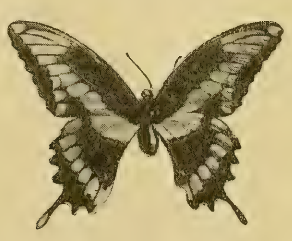

Fig. 2. *P. cresphontes* var. *maxwelli.*

This variety is named after my esteemed friend Mrs. J. B. Maxwell, of Faribault, Minn.

A NEW STAGMOMANTIS FROM FLORIDA.

By Wm. T. Davis, Staten Island, N. Y.

From Delaware southward through the Gulf States to Texas and northward to Kansas and southern Indiana there is a species of Mantis known as *Stagmomantis carolina* (Linnæus).* This insect is subject to great variation in color, the females more so than the males. Green or brown specimens are most common, but there are also individuals with pink wings and still others that have them yellow in color. Sometimes the contrasting colors are exceedingly beautiful, and among so much variation it is no wonder that several names have been bestowed upon the insect. The tegnima of *Stagmomantis carolina* covers about two-thirds of the abdomen in the females, and the discal dark spot is conspicuous. In the author's collection there are twenty-eight female *carolina* collected from Maryland to Texas, that are alike in the features mentioned, except that those from the northern part of the range of the species are usually smaller than those from further south.

While collecting in Florida in 1911, 1912 and 1913, mantids were found that had shorter tegmina and a more slender pronotum than usual, and they were examined with much interest, but the few examples secured at that time were labeled *carolina*. However, more specimens have since been received from Florida, and I have, through the kindness of Messrs. Rehn and Hebard, of the Philadelphia Academy of Natural Sciences, been able to examine their extensive series. From this study it is evident that two species of *Stagmomantis* inhabit Florida, and the one with short tegmina appears to be undescribed.

Stagmomantis floridensis, new species.

Type female, Punta Gorda, DeSoto County, Florida, November 13, 1911 (Davis). Davis collection.

Allotype male, Parish, Manatee County, Florida, September 24, 1918 (Joseph Lienhart). Davis collection.

The type, and all of the other females of this species so far

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* A very complete bibliography of this species by Mr. and Mrs. Rau is contained in the Trans. Acad. Sci., St. Louis, vol. xxii.

examined are green, the tegmina are green, often with the front margin yellowish; the discal spot is also yellowish and not conspicuous; the hind wings are yellowish and tessellate on the outer half or third only, the basal portion and front margin of an even color with no translucent spaces. In female *carolina* the discal spot of the tegmina is conspicuous and the hind wings are tessellate over a much wider area, sometimes to the base of the wings. In *floridensis* the abdomen of the female is tapering, of the same general size over much of its length, and the tegmina extend about one-half the way down. In female *carolina* the abdomen is more fusiform, broadest at about the fourth segment, and the tegmina cover all but the apical third. The shape of the abdomen in *floridensis* and size of the tegmina is more as in the genus *Phasmomantis*, and the species is certainly an approach to that genus. The pronotum is slender in *floridensis* and its greatest width is contained in its length a little over five times, whereas in *carolina* the pronotum is more robust, and the greatest width is contained in its length about four times. The head is proportionately smaller in the new species than in *carolina*. These differences are brought out in the figures.

In the male allotype and in a paratypic male the tegmina are hyaline and the stigma is absent; the wings are also hyaline with about four rows of fuscous spots along the hind margin. The pronotum is more slender than in *carolina*, as already described for the female. The arrangement of the spines on the front legs is the same in both species. The hooks of the genitalia of the male are short and stout, whereas in *carolina* they are long.

MEASUREMENTS IN MILLIMETERS.

	Female Type.	Male Allotype.
Length of body	71	62
Length of pronotum	27.5	22
Greatest width of pronotum	5	4.5
Length of tegmen	24	38
Length of cephalic femur	18.5	13.5
Length of median femur	18	13
Length of caudal femur	21	17

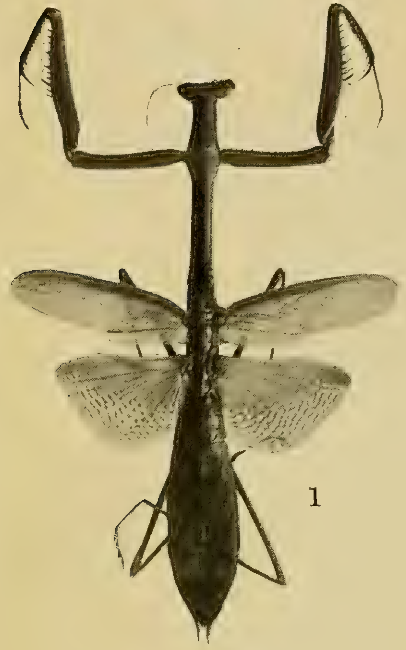
In addition to the type and allotype, the following specimens have been examined: In the collection of the Philadelphia Academy of Natural Sciences; Pablo Beach, Fla., September 27, 1913, female (W. T. Davis); Carrabelle, Fla., September 23, 1915, female (Rehn and Hebard). The following in the author's collection: Pablo Beach, Fla., September 5, 1913, female; La Grange, Brevard Co., Fla., October, 1913, female; Everglade, Lee Co., Fla., July, 1912, female; Parish, Manatee Co., Fla., four females collected from October 2 to 20, 1916 (Joseph Lienhart), also collected at same place September 24, 1918, female; October 7, 1918, female and September 29, 1918, male.

While these dates are all in the late summer or fall, mature female mantids are to be found in the spring as well, for we collected *Stagmomantis carolina* at Everglade, Lee Co., Florida, in April, 1912. Of this last species we have Florida specimens from South Jacksonville, New Augustine, La Grange, Corinardo, Big Pine Key, Punta Gorda and Parish. This and *Stagmomantis floridensis* are associated and appear to be about equally common.

As the species of the genus *Stagmomantis* have become much confused in literature it may be well to further consider some of the relatives of *S. floridensis*. In Kirby's catalogue of 1904 the several synonyms of *S. carolina* mentioned appear from a further examination of the descriptions to be such, and most of them were also so recorded by Mr. Scudder in his catalogue of 1900.

In 1813 Casper Stoll described *Mantis carolina* in Spectres, Mantis, and gave on plate 24 figure 91 a picture of the female in the brown phase. He also shows on the same plate in figure 92 a female of a species from Georgia and Virginia of what we now known to be the same insect in the green phase. Stoll considered this last a male, probably because the abdomen was not as stout as in the brown example. As the name *carolina* was preoccupied, Saussure in 1869 called the species represented by figure 92, which he considered distinct, *stollii,* and Kirby so lists it from Georgia, Virginia and Cuba. Mr. Scudder in his catalogue considered *stollii* a synonym of *carolina* Linnæus, which appears to be correct.

In 1859 Saussure described *S. ferox* from Carolina and Mexico; later (1872) he considered it a variety of *dimidiata,* and still later in Bio. Centr.-Amer., 1894, he and Zehntner dropped the variety name and state that *dimidiata* Burmeister is found in



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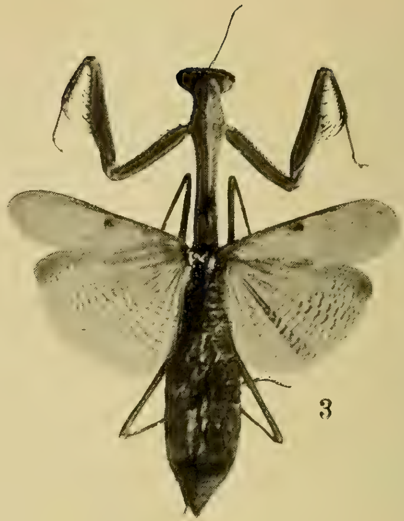

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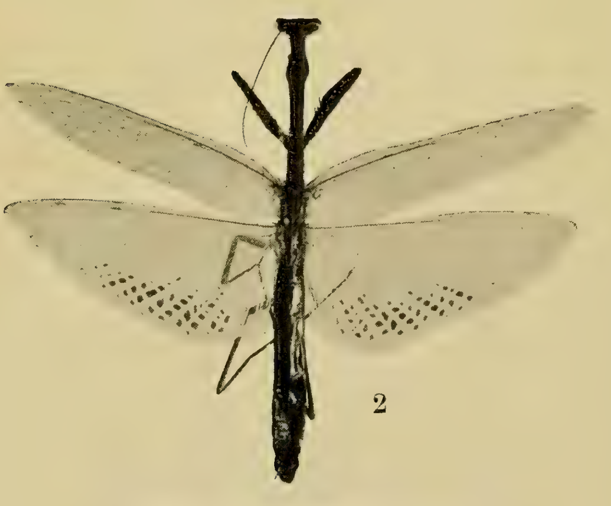

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Stagmamantir floridensis Davis.

North America, Texas and other localities to the south including Cuba. *Mantis dimidiata* was described originaly from South America in 1838. Kirby in his catalogue restores *ferox* to specific rank and gives Carolina, Texas, Mexico and Central America as its habitat. However, the figure of *ferox* published by Saussure in 1872 looks like *carolina* Linn., and Mr. Scudder in his catalogue of 1900 places it as a synonym of that species, which appears to be correct.

Mr. Scudder writing in the Canadian Entomologist, 1896, p. 210, recognizes but two species of *Stagmomantis* in the United States, namely *carolina* Linn. and *limbata* Hahn. He considered that *dimidiata* could not, as far as United States material was concerned, be separated from *carolina*. He further states that *carolina* occurs in Key West and that he received it from Gundlach, supposedly from Cuba. Rehn and Hebard have also recorded *carolina* from Key West.

Stagmomantis tolteca Sauss., 1861, is listed from Texas and southward by Kirby. In 1871 Saussure considered it a variety of *carolina,* but it is now generally given specific rank. It is figured in Miss. Mex. Orthoptera, 1872.

In the collection of the United States National Museum the following four species from the United States have been recognized by Mr. Caudell: *Stagmomantis carolina* Linn., in the brown phase, and its green variety *irrorata* Linn.; *S. limbata* Hahn (1835), from the southwestern states, having the costal campus of the tegmina broader than in *carolina; S. gracilipes* Rehn, Proc. Acad. Nat. Sciences, Phila., 1907, p. 67, from Arizona, and *S. californica* Rehn and Hebard, Proc. Acad. Nat. Sciences, Phila., 1909, p. 416.

Explanation of Plate I.

Fig. 1. *Stagmomantis floridensis* Davis. Type.
Fig. 2. *Stagmomantis floridensis* Davis. Allotype.
Fig. 3. *Stagmomantis carolina* (Linnæus). From Florida.

NOTES ON NEARCTIC HETEROPTERA.

Coreidæ.

By W. L. McAtee.

Harmostes reflexulus var. **virescens** Dallas.

Harmostes virescens; Dallas, W. S. List of the specimens of Hemipterous Insects in the collection of the British Museum, II, 1852, pp. 520–521 [Georgia].

This form seems well enough marked for recognition in nomenclature. It is characterized by clear greenish color (stramineous in some dried specimens) with very slight dark markings of any kind. All specimens seen by me are from west of the Mississippi River. The localities are: Ardmore, So. Dak., Sidney, Nebr., Cañon City, Colo., Promontory Point and Mouth of Bear River, Utah, Graham Mts. and Tucson, Ariz.

Habits of Alydini.

All of the species of Alydini that I have collected about Washington, D. C., breed upon *Ceanothus americanus.* I have not found the nymphs upon any other plants. These remarks apply to *Megalotomus 5-spinosus* Say, *Alydus eurinus* Say and *Alydus pilosulus* Herrich Schaffer.

It may be of interest to note that I found several *Alydus eurinus* under carrion, on Four Mile Run Hill, Va., May 31, 1914. This is the only observation I have made that would indicate a preference on the part of this species, for such material.

Hypselonotus.—The various names cited under this genus in our catalogs and lists may well be arranged as synonyms or varieties* of the earliest of them, namely *fulvus* De Geer. *Hypselonotus fulvus* would appear to be a wide-ranging species with color varieties, which if future study shows, are localized, should be known as subspecies.

Cimex fulvus De Geer, Charles. Memoires pour servir a L'Histoire des Insectes, III, 1773, pp. 341–2 [no locality]. Thorax with a pale yellow median vitta.

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* See note under *Phthia picta* further on.

Cimex striatulus, Fabricius, J. C. Systema Entomologiae, etc., 1775, p. 721 (Brazil). Posterior margin of thorax fuscous with 3 yellow lines.

Lygæus venosus Fabricius, J. C. Entomologia Systematica emendata et aucta, etc., IV, 1794, pp. 142–3 [Cayenne]. No distinguishing characters mentioned.

Hypselonotus dimidiatus Hahn, C. W. Die Wanzenartigen Insecten, 1, 1831, pp. 189–190 [Brazil]. Thorax with 4 black dashes behind; scutellum with yellow median vitta and margins.

Hypselonotus lineatus Stål, C. Hemiptera Mexicana enumeravit speciesque novas descripsit, Entomologische Zeitung (Stettin), 23, No. 7–9, July–Sept., 1862, p. 297 [Mexico]. Thorax with four black lines.

Hypselonotus punctiventris Stål, op. cit., pp. 297–8 [Mexico]. Two interrupted black lines on thorax; three series of black spots on pleura and 5 on venter.

These varieties run into each other, but all specimens I have seen from the United States seem referable to *punctiventris* Stål. Data for specimens examined are:

Victoria, Texas, Sept. 9, Nov. 6, 1902, W. E. Hindls; Nov. 3, 1903, A. W. Morrill; Alice, Texas, Dec. 12, 1894, C. H. T. Townsend; San Diego, Texas, Oct. 27; Beeville, Texas, April 20, 1896, C. L. Marlatt; Nov. 8; San Antonio, Texas, Dec. 10, 1916, J. D. Hood.

FOOD PLANT OF ANASA REPETITA HEIDEMANN.

In the vicinity of Washington this species breeds exclusively upon bur-cucumber (*Sicyos angulatus* L.), upon which it is abundant. Nymphs have been collected from July 19 to October 11.

CHELINIDEA.

From study of the available specimens of *Chelinidea,* in which I have been aided by suggestions from Mr. H. G. Barber I have reached the conclusions embodied in the following key and discussion.

Key to Nearctic CHELINIDEA.

A. *Humeral angles elevated,* as high or nearly as high as intervening parts of thorax. Posterior and lateral margins of pronotum conspicuously reflexed, lateral margins especially elevated, convex posteriorly, concave anteriorly and *passing almost smoothly* (margin interrupted by no more than slight crenulations) *into the large, porrect, sharp-pointed, postocular spines.* Basal joint of antenna foliaceous within, and tibiæ almost foliaceous, especially in males.........................*tabulata* Burmeister.

AA. *Humeral angles distinctly lower* than intervening parts of thorax; pronotal margins not so much elevated particularly anteriorly and less concave. *Postocular spines smaller, blunter; if of medium size then* not porrect, but *directed* somewhat *outwardly.* Tibiæ and basal joint of antenna merely carinate. Both lateral and posterior emarginations of male genital plate more pronounced.

B. Pronotal margin more elevated anteriorly, with a distinct notch at base of short, rather blunt, and outwardly directed postocular spine.........................*vittiger* subspecies *vittiger* Uhler.

BB. Pronotal margin less elevated anteriorly, sometimes not even carinate (almost evenly rounded); postocular spine reduced to a mere blunt tubercle or even entirely lacking.
vittiger subspecies *æquoris* n. subsp.

Chelinidea tabulata Burmeister.

Gonocerus tabulatus Burmeister, H. Handbuch der Entomologie, II, 1, 1835, p. 311 [Mexico]. The original description is obscurely brief, but from the figure in the Biologia Centrali Americana,* which is said (p. 136) to be of a typical specimen, the name may be fixed upon the form characterized in the above key.

So far as seen this species does not lack the contrasting markings on head, although in some specimens the "dark vittæ" are no more than a rich buff but little darker than the median stripe. The corium is a little more distinctly marked than in the other forms, there being usually light and dark longitudinal streaks.

Specimens examined include 4 from Mexico and the following from the United States: Devil's River, Texas, May 4, 1907, F. C. Pratt (U. S. N. M.); Luxello, Texas, Nov. 3, 1916, on *Opuntia*, J. D. Hood (Writer's collection).

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* Insecta Rhynchota Hemiptera-Heteroptera, I, 1880–1893, Pl. 13, fig. 17.

Chelinidea vittiger subspecies **vittiger** Uhler.

Chelinidea vittiger Uhler, P. R. Hemipterological Contributions —No. 2. Proc. Ent. Soc. Philadelphia, II, p. 366, Dec. 1863 [Utah, Fort Benton, Virginia and Louisiana].

Typically this subspecies has the head black with a strongly contrasting median yellow vitta; no specimens entirely lack these markings, though in some of the form mentioned hereafter the general color of head fades to pale brownish yellow. The typical form of subspecies *vittiger* has the antennæ and legs black, and in most cases dark markings on both anterior and posterior parts of pronotum.

A variety which I call *artuflava* new variety has the antennæ and legs chiefly or entirely yellow to orange; and usually lacks the anterior and sometimes all dark markings on thorax.

The specimen of *C. vittiger* in National Collection labelled as Uhler's type bears no other data. Since Virginia and Louisiana specimens belong to the new subspecies described hereafter, these localities, although mentioned by Uhler in connection with the original description, are eliminated from consideration of the type locality of *vittiger*. Two localities remain: Utah and Fort Benton. An entire state is too indefinite for a type locality, hence I select Fort Benton, Montana, as the type locality of *Chelinidea vittiger vittiger* Uhler.

Specimens of *Chelinidea v. vittiger* examined: Greeley, Colo., June 2, 1904, E. S. G. Titus (U. S. N. M.); Poudre River, Colo., June, 1883 (U. S. N. M.); Canon City, Colo., Sept., 1898, H. Soltau (U. S. N. M.); Platte Canyon, Colo., May, Dyar and Caudell (U. S. N. M.); Chimney Gulch, Colo., May 13, 1901, Dyar and Caudell (U. S. N. M.); Fort Collins, Colo., April 11, 1899; June 6, 1904, E. S. G. Titus (U. S. N. M.); Bennett, Colo., May 22, 1915, D. E. Lantz (Biol. Survey); numerous specimens labelled simply Colorado; Evanston, Wyo., June 15, 1885 (U. S. N. M.); Newcastle, Wyo., May 6, 1916, R. T. Jackson (Biol. Survey); Ogden [Utah], (U. S. N. M.); Koehler, N. Mexico, Aug. 18, C. N. Ainslie (U. S. N. M.); Arizona (U, S. N. M.); Los Angeles Co., Calif., Coquillett (U. S. N. M.).

Specimens of *Chelinidea v. vittiger* var. *artuflava* n. var. examined: Texas (U. S. N. M.); Fort Defiance, N. Mex. (U. S. N.

M.); Huachucha Mts., Ariz., July, G. Beyer (Type, U. S. N. M.); Tucson, Ariz., Jan. 1, 10, on *Opuntia* (U. S. N. M.); Dec. 30, on *Cereus giganteus,* H. G. Hubbard (U. S. N. M.); Hot Springs, Ariz., June 14, Barber and Schwarz (U. S. N. M.); Grand Cañon, Ariz., July 10 (U. S. N. M.); Fort Grant, Ariz., Horn; July 14, H. G. Hubbard (U. S. N. M.); Palm Springs, Calif., Feb. 7, 24, H. G. Hubbard (U. S. N. M.).

Chelinidea vittiger subspecies **æquoris** n. subsp.

In its most pronounced phase this subspecies is characterized by very low pronotal margins, especially along the sides anteriorly, which in some specimens are scarcely carinate (that is almost smoothly rounded over). The postocular tubercle in all is very small, in some entirely lacking. The color of typical specimens is the palest of any *Chelinidea* examined, being with the exceptions of the greenish black membrane and reddish eyes, entirely stramineous to sordid buff.

The name proposed for the subspecies, derived from a word applied by the Romans to smooth bodies of water and by license to areas of level ground, is considered appropriate for a form which seems to be restricted to the Atlantic Coastal Plain the best marked biotic area of Eastern North America.

Type male and allotype female from San Diego, Texas, May 6 and May 2, E. A. Schwarz (U. S. N. M.). Other specimens examined: San Diego, Texas, April 30, E. A. Schwarz (U. S. N. M.); Columbus, Texas (U. S. N. M.); Brownsville, Texas, Wickham (U. S. N. M.); Texas, on Opuntia (U. S. N. M.); San Antonio, Texas, Oct. 29, 1916, on *Opuntia,* J. D. Hood (writer's coll.); Luxello, Texas, Nov. 3, 1916, on *Opuntia,* J. D. Hood (writer's coll.).

A form of subspecies *æquoris* with the legs and antennæ nearly or entirely black, with darker corium and dark bar across posterior part of pronotum, may be known as variety *artuatra,* new variety. This form contains the variants toward subspecies *vittiger.*

Type male from Southern Pines, N. C., Dec., 1906. Other specimens examined: Virginia, Uhler; Selma, Ala., on *Opuntia,* Oct. 30, E. A. Schwarz; Dallas, Tex.; Hockley, Tex.; Hackberry, Tex., on *Opuntia;* Texas, May 20 (all specimens in U. S. N. M.).

VARIETIES OF *Phthia picta* DRURY.

The extensive synonymy of this species indicates its great variability. The fact that a name is cited in specific synonymy, however, is no reason against its use with varietal significance. If numerous color varieties of species are placed indiscriminately in collections, the effect is a hodge-podge that is anything but desirable. The synonyms of *Phthia picta,* therefore, are cited below with notes on the differential color characters so that the names may be used for the particular color phases of the species to which they were originally applied.

Cimex pictus Drury, D. Illustrations of Natural History, I, 1770, pp. 107–8, Pl. XLV, fig. 1 [Antigua]. Thorax red with black patches near anterior and posterior margins.

Cimex ciliatus Fabricius, J. C. Systema entomologiæ, etc., 1775, p. 706 [America]. Margin and posterior fascia of thorax yellow.

Cimex leprosus Fabricius, J. C., op cit., p. 719 [America]. Posterior margin of thorax and two spots red.

Cimex candelabrum, Goeze, J. A. E., Entomologische Beytrage, etc., 2, 1778, p. 254. A straight synonym.

Lygæus crenulatus Fabricius, J. C., Entomologia Systematica emendata et aucta, etc., IV, 1794 [Islands of America]. Large spot and posterior margin of thorax black. A straight synonym.

Lygæus dispar, Fabricius, J. C., Systema Rhyngotorum, etc., 1803, p. 214 [America meridionali]. Black, thorax and anterior half of elytra red margined.

Anisoscelis divisus Herrich-Schaffer, G. A. W., Die Wanzenartigen Insecten 7, 1844, p. 9 [Brazil]. Lateral margins and posterior antemarginal fascia of thorax, scutellum, apex of elytra and base of costa orange.

Anisoscelis pulverulentus, Herrick-Schaffer, loc. cit., pp. 9–10 [Mexico]. Sides of thorax and elytra orange; thorax ochraceous sparsely black spotted, black posteriorly.

Leptoscelis obscura Dallas, W. S. List of the specimens of hemipterous insects in the collection of the British Museum, II, 1852, p. 458 [Columbia, Cayenne]. Thorax and elytra narrowly red margined.

Anisoscelis anulipes Guerin-Meneville, in Sagra, R. de la, Historia fisica, politica y natural de la Isla de Cuba, Historia Natural, VII, 1856, pp. 161–2 [Cuba, Guadeloupe]. Thorax and elytra red margined.

The writer has seen specimens of variety *dispar* Fabr. from Southern Florida and from San Antonio, Texas. (Nov. 2, 1916, J. D. Hood.)

MEROCORIS.

Following are the names that have been proposed for forms of this genus occurring in the United States:

Lygæus typhæus. Fabricius, J. C., Supplementum Entomologiæ Systematicæ, 1798, pp. 537–8 [Carolina].

Coreus acridioides. Fabricius, J. C., Systema Rhyngotorum, etc., 1803, p. 200 [Carolina]. An exact and gratuitous synonym of the preceding.

Merocoris rugosus. Amyot, C. J. B., et Serville, A., Histoire Naturelle des Insèctes. Hémiptères, 1843, p. 244 [Carolina].

Merocoris distinctus. Dallas, W. S., List of the Hemipterous Insects in the Collection of the British Museum, II, 1852, p. 491 [St. Louis].

Unless controverted by evidence derived from the type specimens, the three forms having Carolina as the type locality must be regarded as identical. Mr. H. G. Barber recognizes* this form, under the name *typhæus* as separable from *distinctus.*

Specimens of *Merocoris* from the western United States differ principally from those of the east in the shorter terminal antennal joint. In the former it is about 3.3 to 4.5 times as long as thick while in the later it is from 5.3 to 7.25 times. Intergrades occur and for that reason the western form is regarded as a subspecies for which the name *Merocoris typhæus* subspecies *curtatus* new subsp. is proposed.

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*Insects of Florida, II. Hemiptera. Bul. Am. Mus. Nat. Hist., 33, pp. 518–9, August 21, 1914.

The differences are slight, however, and the present writer would range this form and the new one indicated below as subspecies of a single transcontinental species. These three subspecies may be separated as follows:

A. Beak reaching past middle coxæ................subspecies *typhæus.*
AA. Beak not or barely attaining middle coxæ.
  B. Length of terminal antennal joint 5.3 to 7.25 times its diameter ....subspecies *distinctus.*
  BB. Length of terminal antennal joint 3.3 to 4.5 times its diameter ....subspecies *curtatus* n. subsp.

Color in all three forms is extremely variable, and apparently must be disregarded in classification.

As type of the new subspecies, a specimen from Los Angeles Co., Calif., collected by D. W. Coquillett, is selected. This specimen is figured in *The Insect Book,* L. O. Howard, 1904, Pl. 29, fig. 13, and is deposited in the National Museum.

Specimens of *Merocoris typhæus curtatus* examined came from the states of California, Arizona, New Mexico, Colorado and Texas.

Specimens of *Merocoris typhæus distinctus* have been seen from New York, New Jersey, Maryland, Virginia, Alabama, Illinois, Iowa, Missouri, Arkansas, Kansas and Oklahoma.

Specimens of *Merocoris typhæus typhæus* have thus far been seen only from Florida.

Pentatomoidea.

SEPARATION OF JUGÆ IN *Dendrocoris humeralis.*

In Mr. H. G. Barber's key to *Dendrocoris,** *D. humeralis* is placed in the section with "head rounded in front, with lateral lobes more or less in contact." It is worth noting that some specimens collected in the vicinity of Washington, D. C., which agree in other respects with *D. humeralis* have the jugæ distinctly separated in front of tylus.

* Ent. News, 22, No. 6, June, 1911, p. 269.

Thyanta custator var. **accerra** new variety. Differs from the ordinary form as follows: general color brownish green to yellowish brown, with faint fuscous vermiculations on thorax, corium and scutellum. On latter, fuscous markings are aggregated, and bound a sharply defined pale median vitta from apex to near base. Lateral margins of pronotum in pronounced forms nearly black. Corium with numerous small, distinct, irregular pale areas. Membrane with numerous distinct black dashes along veins. Connexivum more distinctly banded. Lower surface partaking of the general ground color, plentifully sprinkled with fuscous to black dots. Spiracular orifices and ends of abdominal incisures black.

Type: A female from Barachias, Ala., Oct. 15, 1916, E. G. Holt (U. S. Nat. Museum). Two other specimens from same locality, Oct. 21, 1916, same collector (Biological Survey). One from San Antonio, Texas, Oct. 29, 1916, J. D. Hood (W. L. McAtee).

BLACK POINTS AT EDGE OF ABDOMINAL INCISURES OF *Euschistus*.

This character used for the third division in Van Duzee's key to the species of Euschistus,* is not, I am convinced, extraordinarily reliable in the differentiation of Pentatomidæ. Specimens, which by their identity in every other respect certainly are *Euschistus variolarius* Pal. Beauv. have distinct incisural spots, although absence of such spots ordinarily is one of the best marks of that species. Specimens at hand with incisural spots are from Riverhead, N. Y., West Cornwall, Conn., Westport, Conn., and Mendham, N. J.

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* Van Duzee, E. P., Trans. Am. Ent. Soc., 30, 1904, pp. 43–44.

A LIST OF THE BUPRESTIDÆ AND CERAMBYCIDÆ TAKEN ON LONG ISLAND, N. Y.

By Alan S. Nicolay, New Brunswick, N. J.

Owing to the ease with which it may be reached from the city, as well as to the richness and diversity of the flora, Long Island has become a favorite collecting place for entomologists. Although only one hundred miles in length, this island has the typical scrub oak and pine barren sections as well as an abundance of deciduous woodland and maritime regions.

Mr. William T. Davis has collected more thoroughly and more exhaustively on Long Island than any other collector. He very kindly furnished me with a complete list of his captures in these two families. Mr. Frederick Schott and Mr. Ernest Shoemaker have also done much collecting, principally near the city. My own collecting was done in great part around Bellport on the South shore where I spent three summers.

BUPRESTIDÆ.*

Acmæodera Esch.

A. tubulus Fabr. (*culta* Weber) Common everywhere on flowers; May–July.

Dicerca Esch.

D. divaricata Say. Wading River, May 30 (Nicolay).

D. caudata LeConte. Bayshore, July (Olsen).

D. punctulata Sch. Yaphank, July–Sept. (Davis & Oslen): Massapequa, May 27 (Shoemaker): Wading River, Aug. 8, in burrow of Cerceris (Davis): Bellport, June–Aug. Not rare, specimens taken beating live pine needles and occasionally found dead on sunny roads (Nicolay).

D. lurida Fab. Abundant throughout Island, also taken in wash-up along the coast.

D. tuberculata Cast. & Gory (asperata Cast. & Gory). Flatbush,

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* The arrangement of the species follows Kerremans.

June 5; Huntington, Sept. 5 (Schott): Jamaica (Pearsall). On dead oak.

D. mutica LeConte. Known only by a unique described from Brooklyn. Is probably a European species which should never have entered our list?

CINYRA Cast. & Gory.

C. gracilipes Mels. Half-Way-Hollow Hills, July 4 (Davis): Rosedale, July 15, beating oak (Schott). Always rare.

BUPRESTIS Linn.

B. striata var. *impedita* Say. Bay Shore (Olsen). The only record from Long Island.

B. lineata Fab. Wading River, July 27 (Davis): Bayshore (Olsen): Bellport, Yaphank, July–August; Common around piles of dead pine logs (Nicolay).

B. maculipennis Gory. Massapequa, June 29 (Shoemaker): Wading River, August 12; Wyandanch, July 18; Fire Island Beach, July 20 (Schott): Bellport, July–August (Nicolay). Occurs with lineata but not so common, although by no means rare.

MELANOPHILA Esch.

M. acuminata DeGeer. Rockaway Beach, June; in wash up (Shoemaker & Schott).

M. aeneola Mels. Oakdale, August 8 (Schott): Bayshore, July 3 (Olsen): Yephank, July (Davis): Suffolk Co., July–August; on pitch pine (Schott).

ANTHAXIA Esch.

A. quercata Fab. Very abundant throughout Island in June and July on scrub oak.

CHRYSOBOTHRIS Esch.

C. sexsignata Say. Aqueduct, July (Shoemaker): Huntington, May 30; Wyandanch, May 7; Flatbush, July 21 (Schott).

C. azurea LeConte. Jamaica (Pearsall): Aqueduct, July (Shoemaker): Montauk Beach, June 20–July 2 (Schott). Beating oak and in wash up.

C. pusilla Cast. & Gory. Common throughout pine regions, June–July.

C. dentipes Germ. With the preceding and almost as abundant.

C. floricola Gory. Yaphank, July (Davis): Wyandanch, July 5 (Schott): Bellport, June (Nicolay). On pine.

C. femorata Oliv. Common everywhere, June–August; on forest and fruit trees.

Actenodes Lac.

A. acornis Say. Mastic (John Nichols): Rockaway Beach, June Shoemaker): Yaphank, July 13; Orient, July; Montauk Beach, July 2 (Davis): Bellport, Port Jefferson, June–July (Nicolay). Specimens most generally met with in wash up.

Eupristocerus Deyr.

E. cogitans Web. Aqueduct, July (Shoemaker).

Agrilus Steph.

A. bilineatus Web. Common on chestnut, June–August.

A. acutipennis Mann. Central Park, May–June (Shoemaker): Bellport, June 30; very active in bright sun on oak leaves, not over common (Nicolay).

A. arcuatus Say. Wyandanch, Aug. 21 (Olsen): Yaphank, July; Wading River, June 26; Half-Way-Hollow Hillis, July 2 (Davis): Bayshore, July (Shoemaker).

A. arcuatus var. *coryli* Horn. Wyandanch, Aug. 21 (Olsen).

A. ruficollis Fab. Common wherever blackberry bushes are found, June–August.

A. lateralis Say. Massapequa, July 10 (Shoemaker): Half-Way-Hollow Hills, July 2; Yaphank, June 9 (Davis): Bellport, July 9–14. Although generally considered rare, this species is locally not uncommon (Nicolay).

A. defectus LeConte. Massapequa, May–June (Shoemaker): Pine Lawn (Olsen): Wyandanch, July 4 (Schott): Wading River, June 23. On scrub oak (Nicolay).

A. egenus Gory. Common wherever scrub oak grows, May 30–August.

A. imbellis Crotch. Yaphank, June 19 (Davis): Queens, July 10 Schott).

A. fallax Say. Half-Way-Hollow Hills, July 4 (Davis).

A. otiosus Say. Common, May 30–July.

A. obsoletoguttatus Gory. Common everywhere on oak, May–June.

RHÆBOSCELIS Chev.

R. tenuis LeConte. Dyker Meadows, July 6 (Shoemaker): Bellport, June 27 (Nicolay).

PACHYSCHELUS Sol.

P. purpureus Say. Queen, November 28, sifting (Schott).

P. ovatus Say. (*lævigatus* Say). Yaphank, June 11–July 13 Davis): Bellport, June 17–July 1 (Nicolay). Not rare sweeping.

BRACHYS Sol.

B. terminans Cast. & Gory (aerosa Mels.). Common on oak, May 29–July 25.

B. æruginosus Gory. With preceding, but not so abundant, June–July.

B. ovatus Weber. Everywhere on scrub oak, May 23–August 30.

TAPHROCERUS Sol.

T. gracilis Say. Common on Island, sweeping and in wash up, June–August.

MASTOGENIUS Sol.

M. subcyaneus Leconte. Aqueduct, July 14, sweeping (Shoemaker): Jamaica (Schott).

SPONDYLIÆ.

PARANDRA Latr.

P. brunnea Fabr. Locally abundant during July and August around decaying logs.

(*Continued in April number.*)

THE MALE OF LYGUS UNIVITTATUS WITH THE DESCRIPTION OF A NEW LYGUS (HEMIP. MIRIDÆ).*

By Harry H. Knight, Ithaca, New York.

Lygus (Neolygus) univittatus Knight. (Bull. Cornell Agr. Expt. Station, 1917, No. 391, p. 623.) When this species was described the males were not available for study thus the genital claspers could not be figured. In the summer of 1918 this interesting species was found by Mr. W. H. Wellhouse to be breeding on *Cratægus* which grows abundantly in a pasture belonging to the College of Agriculture at Ithaca, New York. The bugs were observed to feed on the hawthorn fruits as well as the tender foliage. It is apparent that the species is very scarce in western New York where the type female was taken, the writer always collecting extensively on *Cratægus* taking *Lygidea mendax, Heterocordylus malinus* and *Camptobrochis grandis* frequently, but only the twe females of *Lygus univittatus.*

The species is easily distinguished from the other members of the genus by the fuscous first antennal segment, scutellum with a median fuscous longitudinal vitta, and in having the apex of the cuneus reddish. Structurally the species is very close to *communis,* it being placed correctly in the original paper.

Allotype: ♂, June 10, 1918, Ithaca, New York (W. H. Wellhouse); Cornell University Collection.

Mr. Wellhouse also took: ♀ May 23, ♂ May 29, ♂ May 31, ♂ June 10, ♀ June 19, ♀ June 27, all on *Cratægus.*

It is very probable that *univittatus* may some day be found breeding on apple, since the apple red bugs came over from *Cratægus* and are now well established as pests on culivated apples.

Lygus (Neolygus) parrotti, new species.

Closely related to *viburni* but distinguished by the longer rostrum, fuscous rays on the disk of the pronotum, segments I and II of antennæ yellowish, clavus and apical half of the corium dark fuscous; resembles *parshleyi* but differs in the right genital clasper and in the entirely yellowish segments I and II of the antennæ.

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* Contribution from the Department of Entomology of Cornell University.

♂. Length 5.1 mm., width 1.94 mm. *Head:* width across eyes .97 mm., vertex .34 mm., yellowish, strongest yellow on the tylus and lower part of the face; *rostrum:* length 1.57 mm., just attaining the base of the posterior coxæ, yellow, the tip fuscous.

Antennæ: segment I, length .60 mm., II, 1.99 mm., III, 1.14 mm., IV, .60 mm., yellow, segments III and IV pale fuscous.

Pronotum: length .94 mm., width at base 1.68 mm., collar .60 mm.; yellowish to brownish, a widening fuscous brown ray behind each callus; fuscous on the sides behind the coxal cleft. *Scutellum* yellowish. *Sternum* yellowish, sides and pleura fuscous.

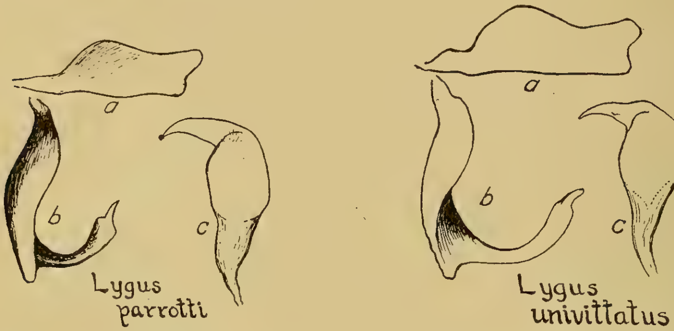

FIG. 3. *Lygus parrotti, L. univittatus,* male genital claspers. (*a*), left clasper, lateral aspect; (*b*), left clasper, dorsal aspect; (*c*), right clasper, ventral aspect.

Hemelytra: yellowish, clavus and apical half of the corium dark fuscous; cuneus clear to yellowish; membrane fuscous, veins and basal half of the cells slightly paler.

Legs: yellowish, apical half of the posterior femora fuscous with two pale rings near the apices.

Venter: pale to yellowish beneath, sides and genital segment fuscous; genital claspers distinctive of the species (Fig. 3).

♀. Very similar to the male in coloration.

Holotype: ♂, May 28, 1915, Geneva, New York (P. J. Parrott); Cornell University Collection.

Allotype: Taken with the type.

Paratypes: ♂, taken with the types. 6 ♀♀, 7 ♂♂, June 1, 1918, Geneva, New York (P. J. Parrott).

The species was found breeding on *Viburnum sterilis* and *Viburnum opulus* by Prof. Parrott and was rather common on the latter plant. It is noteworthy that the writer or other collectors had never taken this species, though extensive collecting was done in western New York.

THE IDENTITY OF EVANIA URBANA BRADLEY, 1908 AND EVANIA PUNCTATA BRULLÉ, 1832.

By J. Bequaert, New York, N. Y.

In describing *Evania urbana* (Trans. American Ent. Soc., XXXIV, 1908, pp. 140–141) J. C. Bradley remarks: "It is of course possible that it may represent another exotic species, migrating similarly to *E. appendigaster.*" Indeed, the distribution of this species in the United States, where it has been found in houses in the eastern cities only, made this suggestion appear very plausible.

A small collection of Hymenoptera recently sent to me by my friend, Mr. E. de Bergevin, of Algiers, included a specimen of *Evania punctata* Brullé, taken at Tunis, which agrees perfectly with my North American specimens of *E. urbana.* I have also carefully compared it with two paratypes of the latter, taken in New York City and preserved in the collection of the American Museum of Natural History. Moreover, Bradley's detailed description and figures fit the Tunis specimen admirably. Schletterer (Ann. Naturh. Hofmus. Wien, IV, 1889, p. 140, Pl. VI, fig. 8) gives a good account of *E. punctata,* which was originally described by Brullé in Expédition Scientifique de Morée, Zoologie, III, pt. 1, 1832, p. 378. Professor Bradley, who has kindly examined the Tunis specimen, is also of the opinion that *E. urbana* and *E. punctata* are the same species.

It would appear that *E. punctata* is not so widely spread as *E. appendigaster,* which, through the agency of man, has now become nearly cosmopolitan. Both species, however, might have been often confused. Schletterer gives the range of *punctata* in the Old World as follows: Southern France, Austria, Dalmatia, Carniola, Hungary, Italy, Greece, Syria, Palestine; and one record for southern Germany (Stuttgart). It is interesting to note that in New York City this cockroach-parasite is seemingly more abundant than its relative, *E. appendigaster.* Thus out of six specimens of *Evania* caught in my rooms during the last three years, five are *punctata* and a single one is *appendigaster.*

EDITORIAL.

THE FAR FLUNG FIELD OF ENTOMOLOGY.

"One phase of zoölogy has for its aim to give a descriptive inventory of the animal kingdom. We should remember, however, that this is merely one aspect of zoology." (Locy.)

The day is here when entomology can take its due place in the forefront of the sciences, together with chemistry, physics, astronomy and those others which have heretofore been called exact. Too long have we entomologists been obsessed with our heritage of ridicule and neglect by the great world about us; too long have we modestly hid ourselves from the searching gaze of men. At last we are justified spectacularly by the fortunes of war to the general public.

But we must take to heart the words of Locy we quote. Our science has lingered far too long in that preliminary stage of sorting and ticketing and labelling, to the neglect of its realities—life, habits, physiology, psychology, ecology, development of the individual and of the stirps. We entomologists have for our field the vastest assemblage of living beings, exhibiting innumerable variations in form, endless diversity of habit, multitudinous environments—but still we lay stress on new species, varieties, dichotomies, to the neglect in a great degree of the other and no less important threads in the web of life.

If we mean to succeed, if we mean to make our science the dominant form of biological research, the hour is here when we must take the endless material so lavishly spread before us, and from it add to the structure of biology the experimental evidence of its many academic theories. It rests with us to take the all-embracing view and to strive for an ideal; or to continue to plod on with our eyes on the ruts, never once realizing the wonders and beauties about us. If we fail to know and appreciate our opportunities, if we fail to grasp them and make them realities, ours be the shame, where we might have had the honor.

Let us not tie down our imaginations; let us not fear to mount to the very sun. If we fail in high endeavor, we fail honorably, and others will profit. If we succeed, we taste the sweet savor of accomplishment and enjoy the recompense of helping others to knowledge, of adding our share to the edifice of science.

J. R. T. B.

PROCEEDINGS OF THE BROOKLYN ENTOMOLOGICAL SOCIETY.

Meeting of December 13, 1917.—**Verbal communications:** Mr. J. R. de la Torre-Bueno drew attention to a paper by N. A. Labitte (Bull. Nat. Hist. Mus., Paris, France) on the longevity of insects.

President W. T. Bather reported that Mr. Roland McElvare had enlisted and gone to France. In view of the war service of some of our members, the following was passed:

Resolved: That the dues of all members now or hereafter in war service shall be remitted during the continuance of the war.

Mr. E. H. P. Squire, of White Plains, was elected to membership.

Mr. E. H. P. Squire, through Mr. Bueno, exhibited specimens of *Carabus nemoralis* taken in White Plains, Westchester County, where they are fairly common. Mr. Davis noted that the species was now found all about New York.

Scientific programme: Mr. Jacob Doll, under the title "Interesting Moths of Southwestern Utah," exhibited a series of specimens mounted with his usual skill, among others *Ægiale yuccæ* a. *coloradensis*, bred from the several species of yucca common to the region; *Oncognemus nigricaput* and *Ursia noctuiformis.* Mr. W. T. Davis exhibited photographs of *Cicindela repanda* digging holes in a sand dune about one mile east of Aqueduct, L. I. The pictures were taken on September 19, 1917, on which day many *repanda* were digging holes and were observed to be more or less social. In one place there were 28 digging burrows, all close together. When bringing the sand to the surface, the beetle throws it out of the tunnel by using first the legs on one side of the body and then those on the other, moving them very quickly. The holes are used on cold nights, and later *repanda* beetles hibernate in holes in the ground. Mr. F. Conrad Pasch exhibited a box of unidentified Floridian Noctuids. Mr. Howard Notman showed moths, including *Hepialus auratus,* found resting on the under side of a fern; *H. gracilis,* taken at light.

Meeting of January 10, 1918.—Mr. E. L. Bell, 438 Amity St., Flushing, L. I., was elected to membership. Dr. Felix Metzner's resignation was accepted. Officers elected for 1918 were those in office.

Long Island records: Mr. Engelhardt recorded from Prospect Park, Brooklyn, *Papilio cresphontes* on *Ruta graveolens,* the insect being commonly found on prickly ash; Mr. Bather reported securing forty specimens at Red Hook, N. Y., on thistle, and Mr. W. T. Davis reported it taken on Staten Island, on *Ptelia* or hop-tree. Mr. A. C. Weeks showed the indigenous species of *Goës* and described their habits.

Meeting of February 14, 1918.—The By-Laws were amended by abolishing the initiation fee.

Mr. Pasch showed *Pieris hulda* from Alaska. Mr. Notman exhibited a collection of beetles and drawings illustrative of the classification of *Batrisoides*. Mr. Schaeffer in comment, spoke on cheese as a good bait for traps for *Silphidæ*. Mr. Pasch exhibited Florida *Mantids* and Mr. Davis some from Mississippi; a number of other Orthoptera were shown.

Meeting of March 14.—Mr. Bueno reported that the collection of the late G. W. Kirkaldy had been deposited by him in the U. S. National Museum for safe-keeping. He also showed photographs of some of the insects in the boxes to show the condition in which the collection reached his hands. He stated that he wished to go on record thus publicly so that no question might in future arise either in regard to the disposition or the condition of the collection. He also showed four small duplicate boxes containing all the Homoptera, and noted that although Kirkaldy had described many Homoptera there were no types in the lot.

Scientific programme: Dr. J. Bequaert showed two species of Nemestrinidæ collected during the last summer's trip with the Cornell Biological Expedition, one being *Hirmoneura texana* Ckll. and the other an apparently undescribed *Hirmoneura*. These are rather common during June in the drier chaparral region of Central Texas, near San Antonio. *H. texana* also occurs at about 2,500 ft. altitude in the scrub-oak zone of the Pinaleno Mountains of southeastern Arizona. In the early morning these flies are usually seen hovering in the open in the true Syrphid manner, 8 to 10 feet above the ground, producing a very peculiar buzzing noise. Toward noon they hover for a short time among the outer branches of shrubs and trees, now and then resting on a leaf, but they do not seem to move about in the afternoon.

Meeting of April 11, 1918.—Mr. W. T. Davis reported the capture of *Brephos infans* at Central Park, L. I.

Messrs. W. T. Davis and J. Bequaert were admitted to life membership and the $100 from their fees were invested in Liberty Bonds.

Long Island records: Mr. G. P. Engelhardt reported the capture at Queens of *Eutolype rolandi*, about April 1, an early date; also the hatching out of *Apatela funeralis*.

Mr. E. L. Bell spoke on "Some Captures in Flushing," the most notable records being *Orthosia aurantiago* and *Epimecis virginaria* var. *carbonaria*. Mr. Bueno, under the title of "Edible Waterbug Products," showed specimens of *Notonecta indica, Buenoa carinata, Corixa mercenaria* and *C. edulis*. These insects, particularly *Corixa mercenaria,* lay there eggs in enormous masses on bundles of rushes put into the waters of Lake Texcoco, Mexico, by the Indians. According to Guérin-Menneville, in the Magazin de Zoologie for 1848, these were dried and made into a sort of bread called "huautlé" which the Indians ate. At present these dried eggs, as well as the insects themselves, are imported into England and used as bird-food. In discussion, Mr. R. P. Dow stated that he had sampled all our native species of ants, except *Formica rufa,* which is too high flavored. He also related that in the North woods the hibernating *Camponotus pennsylvanicus* is eaten by the French-Canadian lumbermen. Mr. W. T. Davis, in "Remarks on Long Island Insects," said that among other insects taken at Montauk, *Sympetrum costiferum* was in some numbers, as well as *Catocala badia* and the grasshopper, *Spharagemon scudderi.* This last insect has been taken before on Long Island, on the edge of the one-time prairie near Central Park. Three species of *Brachynus* were found, and on the upbeach at night, three *Cicindela dorsalis* were attracted to light and ran toward it when the lantern was placed on the sand. *Tabanus bicolor* was secured; and three Cicadas, *Tibicen auletes, T. linnei* and *T. lyricen* were present in the wooded areas, the last named in great numbers, their songs in some places being continuous like the subdued roar of the seventeen-year Cicada in locust years.

Meeting of May 16, 1918.—Mr. G. P. Engelhardt reported a somewhat serious infestation of the rhododendrons in the Brooklyn Botanic Garden by *Sesia rhododendri.* Dr. J. Bequaert spoke on insects as food staples of African tribes. After reviewing the ordinary vegetable and animal foods of the negro, he stated that cannibalism and entomophagism were doubtless due in a large measure to the scarcity of their ordinary food-staples. To eke out they eat many insects, principally termites, caterpillars and Orthoptera. Termites are collected at the time of their nuptial flights and smoked, being frequently offered in the market; according to Mr. Herbert Lang, they taste like fresh lobster sprinkled with sand. So much are they prized that their nests are considered private property and rival claimants frequently fight for them. In the Ituri Forest, the Medje collect by beating a *Ceratocamid* caterpillar which is dried, smoked and stored; before boiling, the spines which cover the body are carefully removed. The larvæ of various *Anaphe* are very generally eaten, and along the Congo River they are offered for sale to the native boat crews. According to Lang, in May the Logo near Faradje collect large numbers of a katydid resembling a *Neoconocephalus,* which they sweep from the grass with fish-nets. The abdomen, which is very greasy at this season, alone is eaten. Many other insects, such as the ant *Carabra vidua,* larvæ of longicorn and scarabeid beetles, of wild bees, etc., are eaten either as titbits, raw or roasted on sticks. Mr. Jacob Doll showed five species of *Ægiale* (*Megathymus*) defending the separateness of var. *coloradensis* from *A. yuccæ,* this feeding on the high, the former on the low and well down in the roots; *A. cofaqui* also being a low feeder.

Meeting of June 13, 1918.—Mr. F. C. Pasch showed a box of Coleoptera and Lepidoptera, including *Adelocephala albolineata,* McAllen, Tex.; *Hemileuca electra,* Southern California; *Apantesis anna,* Lanesville, N. Y.; and a number of others. Mr. G. P. Engelhardt spoke on the Sesiidæ, showing *Sesia rhododendri* and its workings from Botanic Gardens, Brooklyn; *Sesia tipuliformis,* described from Europe now also found on currant bushes in Botanic Garden, Brooklyn; *Memythrus tricinctus,* which attacks pussy-willows. Mr. Jacob Doll reported finding the larvæ of *Vanessa milberti* on European nettle at Flatlands and of *Apatura clyton* near Evergreen Cemetery, showing the larvæ on hackberry. Mr. W. T. Davis showed a box of Pyrochroidæ, including *Pyrochroa flabellate* Fab., Half Way Hollow Hills, July 3, 1910; *Pyrochroa femoralis* Lec., Gardiner's Island, L. I., N. Y., June 12, 1911 (2 specimens); *Dendroides canadensis* Latr. (*D. bicolor* Newm.), Aqueduct, July 27, 1912; and *Dendroides concolor* Newm., Flushing, May 18, 1918 (E. L. Bell). He also noted that *D. costata* was still to be taken on Long Island. Mr. Davis also recorded from Central Park, L. I., May 26, 1918, the following insects: *Corymbites splendens* on pine; *Elater xanthonomus,* one specimen found on a post oak, probably coming from pine originally, since on October 16, 1916, a number were found under the bark of dead pines at Lakehurst, N. J.; *Elater collaris; Cryptophorus verrucosus,* on Post oak; *Balaninus nasicus,* quite common on scrub oaks, recently emerged from the ground, for the elytra in many instances were not hard; *Chlorochroa uhleri* was swept by Mr. Ernest Shoemaker. Mr. C. E. Olsen showed a box of Hemiptera, including the interesting rarities *Sciocoris microphthalmus* Flor from Cumberland County, Maine, taken by Mr. Nicolay in 1916; *Rhytidolomia senilis* Say, from Central Park, New York City, April 23, 1918, his own capture; *Menecles incertus* Say, Wading River, L. I., April 22, 1917; taken by Mr. Nicolay; *Mineus strigipes,* H. S., Caldwell, N. J., August 31, 1917, taken by Mr. Nicolay; and *Phlepsius maculata* Osborne, Bronxville, N. Y., July 30, 1917, taken by Mr. Woodruff.

Meeting of October 10, 1918.—**Long Island records:** *Cicada hieroglyphica* Say, Riverhead, July 18, 1918, first actual record from Long Island, shown by Mr. W. T. Davis; Dr. Bequaert showed a specimen of *Merodon equestris* Fabr., taken by Mr. G. P. Engelhardt in Brooklyn, June 6, 1912, a male showing at the apex of its hind tibiæ the "peculiar process which at once distinguishes this species in all its varying colors from any ally" (Verrall); he also showed a specimen of the deer botfly, *Cephenomyia abdominalis,* collected by Mr. Notman on Mount Skylight, Adirondacks, July 25, 1918, and mentioned taking a specimen of the European onion fly, *Eumerus strigatus* at White Plains, Westchester County, N. Y.; Mr. Schaeffer exhibited specimens of *Carabus nemoralis* and *Calosoma sycophanta,* both European introductions, of which the first named has become firmly established in New York City and environments, being at present about the most common of the Carabus tribe in Brooklyn, while of the last named only a few specimens had been thus far taken by Mr. Fred Schott and other collectors.

Scientific discussion: This was an account of the season's experiences by the members. Mr. F. C. Pasch recorded *Colias eurytheme* from Brooklyn, and exhibited an hermaphrodite of *Callosamia promethea* and a male *Hyperchiria io* with the eye-spots curiously blurred; Mr. C. E. Olsen secured *Lygæus albulus* Distant, *Pithanus maerkeli* and *Hecatus lineatus* at Woods Hole, Mass., and a pink form of *Amblycorypha oblongifolia.*

Meeting of November 14, 1918.—Mr. R. P. Dow, for the last eight years editor of this BULLETIN, tendered his resignation as editor, as he was going to California to live, the matter being referred to the publication committee. Mr. Ernest Nielsen, 42 Ryerson St., Maspeth, L. I., was elected a member. The resignation of Mr. Fred Wintersteiner was accepted with regret. Mr. Harold Notman was elected a life member. Mr. W. T. Davis spoke on *Merolonche dolli* Barnes & McDonough, from Central Park, L. I., N. Y., April 29, 1917. The specimen was found on the trunk of a tree by Mr. R. P. Dow. The species was described and figured in Contributions to the Natural History of the Lepidoptera of North America. The type came from Central Park, L. I., and is in the Barnes collection. Mr. C. Shaeffer spoke on the Clerid beetles of the indefinite genera *Aulicus* and *Sallea.* Mr. Doll spoke on caterpillar breeding; of *Chlorippe clyton* he secured 2,000 larvæ, demonstrating that this species is single-brooded although larvæ of all ages occur at the same time; he spoke of other well-known forms. Mr. G. P. Engelhardt recorded *Sandalus niger,* dead specimens, from the Palisades.

Meeting of December 12.—Mr. Engelhardt reported seeing *Papilio ajax* circling around in flight at Bergen Beach. Mr. W. T. Davis referred to some articles in *The Guide to Nature* on hornet nests with peculiarly elongated entrances and showed a remarkable series of examples, which did not seem to be restricted to any one species.

J. R. DE LA TORRE-BUENO,
Recording Secretary.

BOOKS.

Injurious Insects and Useful Birds. By F. L. Washburn, M.A. (Lippincott's Farm Manuals.) (J. B. Lippincott Co., $2.50.)

This book, as the author tells us, has been written "to supply the needs of high schools where agriculture is taught, and of agricultural colleges which demand a good text-book that is not too technical." Mr. Washburn's competence for the work is beyond question. The chief difference between this and other economic entomologies is the excellently illustrated part on birds. Very naturally, the methods for insect destruction are based on the latest and best work. This is a useful book for the working entomologist's shelf, as it brings the scattered results of many economic workers into a compact compass.

Main Currents of Zoology. By Wm. H. Locy, Ph.D., Sc.D. (Henry Holt & Co., 1918. $1.35.)

Biology, as a whole, is a science of infinite vistas. Its adepts must, in the nature of things, restrict themselves to far more limited spaces, with discernible metes and bounds, whence we have the sundry divisions of our science of life. But that we may not become narrow, each, particularly we entomologists, should keep in touch with the main stream of science toward which our efforts flow. Few of us have the time, the means or the burning desire to go to the original sources and from them extract the broadening thoughts they carry. To us of little time, Dr. Locy's work is a boon; we can follow as a connected whole the stream of zoölogy from the Greeks to the Renaissance, and through Lamarck and Darwin to Mendel and the moderns. "Zoölogical progress represents a stream of thought" is the text of this work. To help us get our bearings in relation to zoölogy, we entomologists may trust to this guide. We need it to extend our horizons.

J. R. T.-B.

Owing to increased cost, the Publication Committee has decided to make a charge for authors' separates in excess of the gratis 25. This will be 4c. each for papers of one to four pages, 5c. for 5 to 8 pp., 6c. for 9 to 12 pp., proportionately for longer. Special covers will be $1.50 for the first fifty. Half tone plates 1c. additional.

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WANTED.—2d 3d, 4th, 8th, 9th Annual Report of the Entomological Society of Ontario. Will pay a reasonable price for any of the above reports. Jos. I. Beaulne, 3653 Notre Dame East, Montreal, Canada.

WANTED.—19th Illinois Entomological Report; Coleoptera of Southern California, by H. C. Fall; Notes on Lachnosterna of Temperate North America, by John B. Smith; Works of Thos. Say, Le Conte edition. Joe S. Wade, U. S. Bureau of Entomology, Washington, D. C.

WANTED.—North American Orthoptera from localities which are little known or in which but little collecting has been done. Material from the mountainous regions of the West particularly desired. M. Hebard, Academy of Natural Sciences, Philadelphia, Pa.

WANTED.—Sphingidæ from any part of the world. Will purchase or exchange. B. Preston Clark, 55 Kilby St., Room 35, Boston, Mass.

WANTED for cash—Ova of Catocalæ with or without parent moth. Address George J. Keller, 191 Avon Ave., Newark, N. J.

WANTED.—Imagos of *Saperda candida, Pholus pandorus,* all stages of *Macrodactylus subspinosus* except imagos, and other material of economic importance. Ward's Natural Science Establishment, 84 College Ave., Rochester, N. Y.

WANTED.—All kinds of material for Life Histories. Lepidoptera, Coleoptera, Hymenoptera, Diptera, etc., etc. Herman H. Brehme, Box 432, South Amboy, N. J.

Wanted.—Lintner's Injurious Insects, 1886 and 1887 (Rep. 3 and 4). N. Y. Park Rep. 1873–1896. Jour. Appl. Microscopy, I^{9}. Monthly Bul. Calif. Com. Hort., I^{8-10}; II^{3-5}; IV^{3}. Send stamp for list of publications for sale or exchange. Philip Dowell, Port Richmond, N. Y.

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WANTED.—Papers published since 1894 and containing references to American Coleoptera, by Bernhauer, Grouvelle, Lesne, Leveille, Lewis, Pic, Otto Schwarz, Wasmann or other foreign authors. Will pay cash or give in exchange papers by American authors that I have in duplicate. C. W. Leng, No. 33 Murray St., New York City.

WANTED.—For cash or exchange, "Synopsis of the Erotylidæ," Crotch. Wm. Beutenmuller, 879 Whitlock Ave., Bronx, New York, N. Y.

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OF THE

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APR 22 1919
National Museum

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Vol. XIV April, 1919 No. 2

REMARKS ON THE ORIGIN AND SIGNIFICANCE OF METAMORPHOSIS AMONG INSECTS.*

By G. C. Crampton, Ph.D.

In attempting to trace the lines of development of the higher insects, the question of the origin of metamorphosis and of its value as an index of relationships among the higher forms has naturally arisen; and, while I do not think the presence or absence of metamorphosis can be taken as the important factor in determining the relationships of the insects under consideration (as is true of the comparative morphology of recent and fossil adult insects, or of immature forms), this feature cannot be wholly ignored in such a study. That the occurrence of metamorphosis cannot be taken as the deciding factor is evidenced by the fact that it may occur in the males, but not in the females of the same species of Coccidæ and other Homoptera, so that when its evidence is not in accord with that of comparative morphology, and other features, one cannot help but feel skeptical as to its value unless the evidence it offers is confirmed from other sources.

A study of the higher forms, and the types from which they were probably descended, has convinced me that an ancestral group may include some representatives which have developed the tendency toward undergoing a metamorphosis, to a marked degree, while other representatives of the same ancestral group do not exhibit any marked indications of such a tendency. Similarly, in two extremely closely related groups derived from such a common stem containing some members which exhibit a marked tendency toward the development of metamorphosis and some which do not, one of the derived groups may exhibit a marked tendency toward the development of metamorphosis, while the other either does not exhibit this tendency or shows but slight indications of such a tendency.

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* Contribution from the Entomological Laboratory of the Massachusetts Agricultural College, Amherst, Mass.

In order to illustrate the above cited principle by concrete examples, it is necessary first to clearly understand the grouping of the higher insects on the basis of comparative morphology, and to bear in mind the types of insects composing the ancestral group from which these higher forms are descended. The insects comprising the ancestral group, which approximates as nearly as any the types of insects giving rise to the higher forms, have been placed in a superorder called the plecopteroid superorder, composed of the Plecoptera, Embiidæ (s. l.), Dermaptera, Coleoptera and their allies. The coleopterous representatives of this ancestral group have developed a well-marked metamorphosis, while the embiid and dermapterous representatives of the group have not, although the Plecoptera themselves, which are among the most primitive members of the superorder, exhibit a tendency for the immature stages to differ in form from the adults (a condition also apparent in such primitive insects as the Odonata, etc.). The higher insects were developed from ancestral types which I think would have been placed in the above-mentioned ancestral superorder, containing some forms which exhibit a well marked metamorphosis, and some which do not. These higher forms, which are extremely closely related, may be divided into a holometabolous neuropteroid superorder and a "non-metabolous" psocoid superorder. The psocoid superorder (but few of whose members exhibit traces of metamorphosis) is composed of the Psocidæ (s. l.), the Mallophaga, the Anopleura (or Pediculidæ, s. l.), the Hemiptera, the Homoptera, and their allies. (The Thysanoptera might be included in this group, as is possibly the case with the Strepsiptera, but I have as yet been unable to definitely determine this point.) The neuropteroid superorder (which seems to be a holometabolous one) comprises the Neuroptera, Hymenoptera, Mecoptera, Diptera, Siphonaptera (Pulicidæ, s. l.), Trichoptera, Lepidoptera and their allies. We thus have two derived superorders (one of which is practically "non-metabolous," and one which is practically holometabolous) descended from an ancestral group containing some "non-metabolous" forms and also some holometabolous forms; and we would naturally expect that the coleopterous representatives of the ancestral group, being holometabolous, would be somewhat nearer to the derived holometabolous group (*i. e.,* the neuropteroid superorder, comprising the Neuroptera, Hymenoptera, etc.), while the plecopterous, embiid and dermapterous representatives of the ancestral group, being "non-metabolous," would be somewhat nearer to the derived "non-metabolous" group (*i. e.,* the psocoid superorder, comprising the Psocidæ, Mallophaga, etc.), and this is true to some extent.

The derivation of the higher forms, as given above, would readily account for the presence of a metamorphosis in one derived group of higher insects, and its practical absence in the other derived group of higher insects (despite the fact that both derived groups are very closely related), since both of these derived groups are descended from a common stock containing some forms which exhibit a pronounced metamorphosis and some forms which do not. This, however, does not account for the origin of metamorphosis in some members of the ancestral group itself, although the fact that there is a marked tendency for such lower insects as the Odonata to develop a slightly different type of immature form from the adult (a tendency which is also evidenced by the Plecoptera, which are among the lowest representatives of the ancestral group giving rise to the higher forms), may give some hint as to how metamorphosis arose.

I am inclined to think that such a tendency for the immature forms to differ from the adults gradually arose among primitive insects, possibly through mutation, or through the proper combinations of hereditary factors enabling to re-assert itself, a tendency which had remained "latent" through generations of forms descended from Crustacea-like forebears (which showed a marked tendency toward a metamorphosis). Such a tendency for the immature forms to differ from the adults might eventually result in the production of stages which could enter an environment to which the adult, as such, was unable to adapt itself, or stages which might be able to resist temporary conditions which the adults, as such, could not survive; and natural selection would thus tend to perpetuate such forms, thereby tending to further develop a propensity toward the production of complete metamorphosis. This tendency for the immature forms to differ from the adults was apparently developed among some of the primitive forms in the mild climate and favorable environmental conditions then surrounding them, and enabled the forms which developed this tendency to enter less favorable regions in which the more conservative members of the primitive groups could not establish themselves. These favored forms were enabled to enjoy the advantage of obtaining more food, under conditions affording better protection, and less competition; but the modifications enabling them to enter these new conditions must have been developed before they could enter them, so that I would not agree with Handlirsch, 1909 (Die fossilen Insekten), who claims that cold, etc., has *produced* metamorphosis; but would rather claim that insects in which the tendency toward metamorphosis was *already well developed,* were better equipped than their less fortunate fellows, to penetrate the less favorable regions of winter-frost, etc., and there establish themselves. This view, however, can perhaps be more clearly set forth by comparing it with the views proposed by others concerning the origin of metamorphosis.

Kirby and Spence (Introduction to Entomology) propose that the voracious larval stages play a part in the economy of nature, being of use in getting rid of decaying animal and vegetable matter, but, since the voracious feeding proclivity is somewhat incompatible with the work of reproduction which is of great importance to the species, it is suspended when the reproductive period ensues. This view is in line with Perez's suggestion (Bull. Soc. Ent. France, Vol. LXVIII, Année 1899, p. 401) that "l'on peut définir la metamorphose une crise de maturité génitale," which leads to the suggestion that hormones (possibly those of maturing gonads, etc.) may play an important part in the development of the wing buds and other structures of "adolescence," and that these hormones or similar substances may play an important part in influencing the activity of phagocytosis histolysis, and other phenomena of metamorphosis, in conjunction with the profound chemical changes in the blood, etc., which occur at the approach of this period. These matters, however, deal with the physiological rather than the "phylogenetic" explanation of the phenomena of metamorphosis.

Quatrefages (Métamorphoses de l'Homme et des Animaux, p. 133) states that "la larve n'est qu'un embryon à vie indépendante," and as Lameere says (Ann. Soc. Ent. Belgique, Vol. 43, 1899, p. 624): "à la suite d'Owen, et cette interprétation se trouve encore répétée dans des traités de Zoologie très récents, on a considéré que ce phénomène (metamorphosis) était la manifestation d'une dilatation embryogénique; l'évolution des Inséctes à métamorphoses complètes se ferait en dehors de l'œuf, la larve serait un embryon vivant à découvert, tandis que les autres Insectes subiraient les mêmes métamorphoses dans l'œuf. Avebury (Origin and Metamorphoses of Insects, 1902, p. 80) comes to the following conclusions: "That the occurrence of metamorphosis arises from the immaturity of the condition in which some animals quit the egg. That the form of the insect larva depends in great measure on the conditions in which it lives. The external forces acting upon it are different from those which affect the mature form; and thus changes are produced in the young, having reference to its immediate wants rather than to its final form." He therefore divides metamorphoses into "developmental and adaptive" types. He also states that the abruptness of the changes undergone by insects is due in great measure to "the hardness of their skin, which admits of no gradual alteration of form," and suggests that "the immobility of the pupa or chrysalis depends on the rapidity of the changes going on in it."

If the larval stages of insects with complete metamorphosis represent, so to speak, "free-living embryos," while similar changes supposedly undergone *within* the egg by insects which do not exhibit such a metamorphosis, embryology should give some basis for such an assumption—which, however, is not the case. Furthermore, insects leaving the egg in an earlier stage of development (as those with complete metamorphosis are supposed to do) should be more primitive than those remaining for a longer period of development within the egg (as the non-metabolous forms are supposed to do), somewhat after the fashion of the young of the primitive marsupials which are born at an earlier stage of development than the highly developed young of a horse, for example; but this is assuredly not the case, since the holometabolous insects are much higher forms than the insects which do not exhibit such a metamorphosis. As Fritz Mueller (Facts for Darwin, p. 118) aptly expressed it, "there were perfect insects before larvæ and pupæ," and not only does the morphology of the "non-metabolous" forms proclaim them as nearer the ancestral type, but palæontology would also indicate that they were the first types to appear. The view that the larval stages represent "free-living embryos" is open to so many objections, that I prefer to seek the causes of the origin of metamorphosis elsewhere, since I think that there is much more involved than could be explained by such an assumption. Furthermore, I am enough of a "Weismannian" to believe that environment could hardly *cause* metamorphosis (which I think would more probably have arisen through mutation, or some similar method), and would rather consider environment as one of the selective factors acting through natural selection (or similar means) to direct the course of development of metamorphosis which it did not originate! I shall return to this point later, however, since there are several other views on the subject, which necessitate a discussion of this principle.

Lameere, in various publications, has developed the idea that the wood-boring habit has resulted in the production of metamorphosis among the higher insects or, as he expreses it on page 633 of the Ann. Soc. Ent. Belgique (Vol. 43, 1899), "Nous pouvons . . . inférer . . . que la perforation des troncs d'arbre est la cause adjuvante de l'apparition de l'holométabolisme." This mode of life has resulted, he states, (p. 127 of the Annales, Vol. 52, 1908) in the following features characteristic of holometabolous insects: "raccourcissement des appendices, antennes, pattes et cerques; remplacement des yeux composés par des yeux simples (for myopic vision); disparition de tout rudiment d'ailes." As reasons for believing that holometabolism arose in this fashion, Lameere states that there are no insects with incomplete metamorphosis living inside of plants with the exception of the Isoptera (and a few primitive Blattidæ), which are apterous during their plant-inhabiting stages, while internal "parasites" of plants form the great majority of holometabolous insects. He likewise considers that in the greater part of holometabolous insects, the most primitive representatives of the group have lignivorous larvæ, or at least larvæ resembling lignivorous larvæ in structure. Lameere believes that holometabolism had a monophyletic origin—in other words, that is occurs only in one group of insects and the forms descended from them.

In discussing Lameere's view, we again come upon the old question of whether such a feature of external environment as life in plant tissue, could *produce* metamorphosis. I think not! I should be much more inclined to consider that bodily changes (and habits also) were first produced (under the normal surroundings of the primitive winged insects) and the insects in which they occurred were thereby enabled to *enter upon* a wood-boring life. Furthermore, I would be inclined to look for a "foreshadowing" of the adaptations which would enable an insect to enter upon a wood-boring existence, in the tendency for many primtive insects to hide under stones and other protected places. We find even in the Thysanura, a well developed tendency to hide under stones, etc., and the same hiding tendency occurs among the Symphyla, and "Myriopoda" in general, as well as in certain Crustacea which are related to insects (*Lygia, Oniscus*, etc.), so that it must have occurred at an early period in insectan development, if this has any meaning. Even in certain Blattidæ, Grylloblattidæ, Gryllidæ and other primitive insects this tendency to hide under stones also occurs, and in the group which I consider as representing as nearly as any the condition ancestral to the "Neuropteroid" insects, there is a widespread tendency to hide under stones or shelter of some kind, as is done by the Dermaptera, Embiidæ, lower Coleoptera (Lampyridæ, etc.), etc. The Plecoptera themselves (*i. e.*, the forms near the base of the ancestral group) show an unmistakable tendency to hide in the adult stages, while their aquatic immature forms are found under stones in the water. Similarly many other primitive water-inhabiting immature stages, such as those of Ephemerids, etc., occur under stones, and the larvæ of the most primitive representatives of the holometabolous insects such as the Neuroptera, etc., exhibit a marked tendency to hide under stones, etc. I find this proclivity to hide under stones or in sheltered locations so widespread, that it has suggested the possibility of such a proclivity (in conjunction with the development of suitable body conditions ultimately leading to the development of subterranean existence, as well as to a wood-boring existence, and adaptations to similar environmental conditions). According to this view, the hiding propensity, in conjunction with the gradual development of suitable bodily conditions, would eventually enable insects to bore in wood, particularly during the more suitable larval state, and thus giving more protection, better food conditions, and similar advantages, would tend to perpetuate and to intensify tendencies developing along the line of the production of a metamorphosis; but such modes of life did not *originate* the tendency toward the development of a metamorphosis.

I do not agree with Lameere in his derivation of the higher insects, and therefore do not consider that the origin of metamorphosis is necessarily monophyletic, though it does occur among some members of the ancestral group from which holometabolous insects were descended. I would rather consider metamorphosis as the gradual development of a tendency for immature stages to differ from the adult stages (as evidenced by lower insects such as Odonata, Plecoptera, etc.) and when this tendency had eventually resulted in the production of types capable of invading new realms (whether these consisted of new media, such as water, wood, earth, etc., or whether new regions of the earth, etc., could be invaded, is immaterial) which the more conservative adult type of creature, as such, could not enter as successfully, these new types were preserved and "accentuated" by natural selection.

(*Continued in June Bulletin.*)

CONCERNING THE SUBSPECIES OF SARCOPHAGA DUX THOMSON.*

By R. R. Parker, Bozeman, Montana.

The flies of the genus *Sarcophaga* previously considered to be subspecies of *S. tuberosa* Pandellé must hereafter be known as subspecies of *S. dux* Thomson. The latter was described from Hawaii by Thomson in Eugenies Resa (pp. 533–540) in 1870 but the relationship of the species was only recently discovered by Dr. Aldrich while examining Hawaiian material. *S. tuberosa,* on the other hand, was described by Pandellé in 1896 (Rev. Ent. Franc., Vol. 15, p. 192). The subspecies affected by this change are *dux, tuberosa, exuberans* Pandellé, *sarracenoides* Aldrich, *luzonensis* (herein described as new), a new species not named for reasons stated below, and possibly *pedestris* Villeneuve (from Arabia) and *maderensis* Schiner (from Madeira). The last two species I have not seen and though Dr. Böttcher (Deutsch. Ent. Zeitschr., 1912, p. 736 and 1913, pp. 368–369) indicates their relationship to "*tuberosa,*" yet he gives no positive data that would justify their inclusion in the group of subspecies. One subspecies is mentioned above as unnamed because of two specimens, determined by Dr. Böttcher as "*Sarcophaga tuberosa exuberans* Pandellé," and sent to the writer at different times by Dr. Bezzi. The first (from Italy) proved to be distinct from what has been called *exuberans* in this country and the writer thereupon prepared a manuscript describing our form as *shermani.* Before this was published the first specimen received was lost in the mail and the second on arriving shortly afterwards proved to be the same as our form which the writer was describing as *shermani.* Hence it is impossible to know positively which of the two forms was *exuberans* without reference to the type. Whichever is not, is new. The chief distinguishing characters of these two forms are given in the next paragraphs and for convenience they may be designated as subspecies *a* and *b*.

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* Contribution from the Department of Entomology, State College, Bozeman, Montana.

Subspecies a.—The form present in the United States and always considered to be *S. exuberans.* Distinguishing characters of male: three rows of black cilia behind eyes; cheek vestiture black; anterior profile outline of forceps prong gently sinuate near tip; the two pairs of distal processes of penis very slender, that pair arising centrally quite long (longer and more slender than in any other known subspecies); posterior spur-like protuberance of distal sclerite of penis very prominent (largest and longest of any subspecies); first genital segment usually brownish, sometimes brownish posteriorly shading into dull orange anteriorly, less commonly dull orange throughout; second genital segment dull orange. It is considered best to consider this form as *exuberans* for the present and it is so discussed in this paper.

Subspecies b.—This form has for the distinguishing male characters the following: Two rows of black cilia behind eyes; vestiture of posterior portion of cheek white, that of anterior portion black; see also figure 13 for characters of penis. The two forceps are essentially the same as in subspecies *a* (considered to be *exuberans*), but the characters of the distal processes and distal sclerite are distinctive.

Examination of specimens of *S. dux* loaned by Dr. Aldrich and of further material subsequently received from Hawaii has convinced me that the subspecies described by me as *S. subtuberosa* (Proc. U. S. Nat. Mus., vol. 54, pp. 89–92) is identical with it. *Subtuberosa,* therefore, becomes a synonym of *dux.*

Ordinarily the brownish color of the first genital segment of *exuberans* (subspecies *a*) would be sufficient to separate it from *sarracenoides* but when this segment is dull orange in color, the only reliable character are those of the forceps and penes. It is probably only rarely that the first genital segment of *exuberans* would not show some brownish coloration, at least posteriorly. In the figures note that the posterior spur-like protuberance of the penis is smaller and more slender and the distal processes shorter and thicker in *sarracenoides.*

S. luzonensis, herein described, is likely to be confused with *tuberosa, harpax* and *dux,* all of which have both genital segments black. It is at once distinguished, however, by the presence of two rows of black cilia behind the eyes, while the first two species named both have three rows and the last but one. Furthermore, *tuberosa* and *harpax* both have the cheek vestiture black, but in *dux* it is similar to that of *luzonensis*.

Sarcophaga dux luzonensis n. subsp.

Male. The characters which distinguish this subspecies from others of the group are as follows: two rows of black cilia behind the eyes; vestiture of posterior portion of cheeks white, that of anterior portion black; first and second genital segment black; tip of forceps prong in profile quite blunt, posteriorly with a distinct tooth; posterior spur-like protuberance of distal, posterior sclerite of penis small and scarcely differentiated (smallest of any of the subspecies).

Described from three male specimens. Holotype (male): author's collection. Length: 8–12 mm.

PHILIPPINE ISLANDS: Mt. Makeling (holotype); Malinoa, Tayabas; Los Baños (C. F. Baker); AUSTRALIA: Queensland, Townsville (F. H. Taylor).

The specimen from Australia is small and not quite typical. There is a partial third row of black cilia behind the eyes, and the forceps do not exactly correspond, but there is no reason to regard it as anything other than an atypical specimen without a considerable series of specimens to compare.

These subspecies are also interesting because of their distribution; one or more of them are known from each continent except South America. A brief summary of distribution is here given. The information is based on occurrence as given by Böttcher (Deutsche Entomologische Zeitschrift, 1912 and 1913), Aldrich ("Sarcophaga and Allies," 1916) and determinations made by author.

S. dux tuberosa Pandellé: EUROPE, Germany, Switzerland, Roumania, Dalmatia, Hungary, Italy, Spain; ASIA, India, Japan; NORTH AMERICA, Canada (Awena, Manitoba, N. Criddle), United States.

S. dux dux: ASIA, Philippine Islands; PACIFIC ISLANDS, Guam, Hawaii.

S. dux harpax Pandellé: EUROPE, Germany, Austria, Hungary, Italy; ASIA, Japan Formosa, Philippine Islands; NORTH AMERICA, United States; PACIFIC ISLANDS, Hawaii.

S. dux luzonensis n. subsp.: ASIA, Philippine Islands; AUSTRALIA, Queensland.

Subspecies a (*exuberans* Pandellé).—Occurs in certain countries of Europe, and probably in Africa and in the United States and Canada.

S. dux sarracenoides Aldrich: NORTH AMERICA, United States, Canada.

Subspecies b. EUROPE, Italy.

TABLE FOR THE SUBSPECIES OF SARCOPHAGA DUX Thomson.

1. Both genital segments black.. 2
   At least second genital segment dull orange........................ 5
2. Cheek vestiture black 3
   Vestiture of posterior portion of cheek white...................... 4
3. In profile anterior and posterior edges of tips of forceps prong parallel and prong with an apical tooth (Fig. 2, 8).........*harpax* Pandellé.
   Forceps more slender in profile, anterior edge near tip gently sinuate (Fig. 3, 10) ....*tuberosa* Pandellé.
4. One row of black cilia behind eyes, forceps prong as in *tuberosa* (Fig. 4, 11) ....*dux* Thomson.
   Two rows of black cilia behing eyes, in profile forceps prong blunt, stout and with apical, posterior tooth (Fig. 1, 7)..*luzonensis* n. subsp.
5. Vestiture of posterior portion of cheek white, two rows of black cilia behind eyes (Fig. 9)..................................subspecies *b.*
   Cheek vestiture black, three rows of black cilia behind eyes......... 6
6. Both genital segments dull orange, forceps approximately as in *harpax* (Fig. 5, 12)...................................*sarracenoides* Aldrich.
   First genital segment usually wholly brown, sometimes partly brownish, rarely without some brown coloration; forceps edges not parallel, in profile anterior edge sinuate near tip (Fig. 6, 13).....subspecies *a.*

The figures of the forceps and genitalia should be used in conjunction with the above table. There is considerable difference in the form of the anterior portion of the penis, though the differences are due to variations in a fundamentally similar structure in each case. It is not wise to place reliance in apparent differences, however, because bending and folding of the delicate edges frequently results in anything but the normal appearance.

The writer has in his records several unpublished notes concerning the habits of three of these flies which are included.

S. dux harpax Pandellé. Material determined for Mr. A. F. Burgess of the Bureau of Entomology was reared from the pupæ of gypsy moth imported from Japan (record numbers 3317 S, 3353, 1638 A, 3314 S), and Austria (853 A). Aldrich has referred to records from German material.

S. dux sarracenoides Aldrich. A male and a female received from Dr. O. C. Bartlett, Phœnix, Arizona, were labelled "Bred from dead larvæ of *Lonicera nitida,* the green June-bug or fig-eater." Two males and two females received from G. H. Vansell, of Lawrence, Kansas, were labelled as reared from *Melanoplus differentialis* and *M. bivitattus,* Ford Co., Kansas. Specimens from W. P. Hayes, of Manhattan, Kansas, were reared by him from dead specimens of *Lachnosterna gibbosa, lanceolata, rubiginosa, crassissima, implicata* and *rugosa.* In the collection

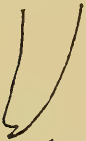

Fig. 1

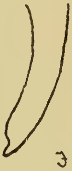

Fig. 2

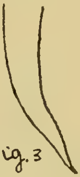

Fig. 3

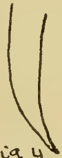

Fig. 4

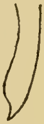

Fig. 5

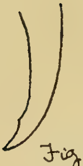

Fig. 6

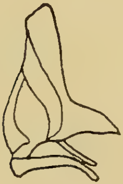

Fig. 7

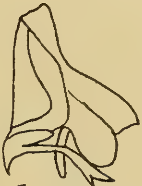

Fig. 8

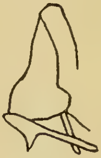

Fig. 9

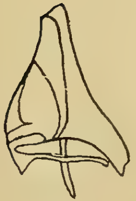

Fig. 10

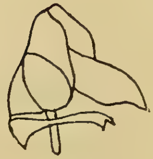

Fig. 11

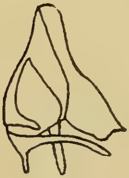

Fig. 12

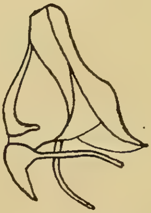

Fig. 13

of the Massachusetts Agricultural College is one specimen bearing the following label: "From maggots in a crab (sea spider), Harpswell, Maine." At Laurel, Montana, in 1914, the author reared this fly from decaying fish. A few specimens were reared by J. R. Parker of the Montana Experiment Station, from dead grasshoppers collected in the Flathead Reservation in the summer of 1917. Others were reared from similar material collected in early September by J. R. Parker and the author.

S. dux subspecies *a* (*exuberans* ?).—A single specimen of this subspecies emerged early in February of 1918 from a dead grasshopper collected by the persons above-mentioned near Ronan, Montana, on September 5, 1917.

Explanation of Figures.

Fig. 1. Profile view of tip of forceps prong of *S. dux luzonensis.*
Fig. 2. Profile view of tip of forceps prong of *S. dux harpax.*
Fig. 3. Profile view of tip of forceps prong of *S. dux tuberosa.*
Fig. 4. Profile view of tip of forceps prong of *S. dux dux.*
Fig. 5. Profile view of tip of forceps prong of *S. dux sarracenoides.*
Fig. 6. Profile view of tip of forceps prong of *S. dux* subspecies *b.*
Fig. 7. Distal portion of penis of *S. dux luzonensis.*
Fig. 8. Distal portion of penis of *S. dux harpax.*
Fig. 9. Distal portion of penis of *S. dux* subspecies *a* (*exuberans* ?).*
Fig. 10. Distal portion of penis of *S. dux tuberosa.*
Fig. 11. Distal portion of penis of *S. dux dux.*
Fig. 12. Distal portion of penis of *S. dux sarracenoides.*
Fig. 13. Distal portion of penis of *S. dux* subspecies *b.*

* The genital segments of the single specimen of this species examined were in such condition that it was impossible to figure the forceps prong or to complete the figure of the penis.

OBSERVATIONS ON PHYSIODES NYCTEIS.

By Chas. Rummel, Newark, N. J.

During 1918 *Physiodes nycteis* was found in abundance over the section of the Orange Mountains from Milburn to Patterson. Adult specimens appear from the middle of June to August. The species is single brooded. Its food plant, the wild sunflower, *Helianthus divaricatus,* is generally distributed over the Orange Mountains. The larvæ begin to hatch from their eggs July 1, feeding in colonies at first. After the second molt, in August, when about one eighth inch in length, they go into hibernation among dead leaves on the ground. They reappear in early spring and attain full growth from May 20 to June 10. The larvæ are black and spiny. Colonies of fifty or more may be found on one leaf, eating only the soft tissue on the upper and underside and leaving the skeleton which shrivels and appears as having been exposed to great heat. The chrysalids are very much like those of *Melitæa phæton,* only smaller in size. The adults are at their best from June 10 to 25.

A NEW PHORID FROM ILLINOIS (DIPTERA, PHORIDÆ).

By J. R. Malloch, Urbana, Ill.

Aphiochæta pallidiventris, sp. nov.

Female.—Black, the head and thorax shining; abdomen pale lemon-yellow, slightly darker towards base dorsally, the extreme base black, sides black on basal half. Legs yellowish testaceous. Wings clear, veins brownish. Halteres dull yellow.

Frons subquadrate, the anteocellar series of bristles straight, the anterior series with each lateral pair of bristles close together, the upper close to eye margin, the lower closer to upper than to the upper postantennnal; four postantennals present, the lower pair nearly as large as upper; third antennal joint small, round; arista about one and one half times as long as frons, microscopically pubescent; palpi larger than antennæ, with 6 or 7 bristles. Mesopleura with a number of bristles of irregular lengths on upper posterior angle; scutellum with 2 strong bristles and 2 weak hairs on margin. Abdomen robust, sparsely hairy on dorsum, most noticeably so at base laterally. Fore tarsi slender; hind tibia with about 10 posterodorsal setulæ which become larger apically. First costal division as long as second and third combined, third about one fourth as long as second; costal fringe long and rather widely spaced; fourth vein with its base at base of fork of third, not recurved apically.

Length, 2.5 mm.

Type, Cobden, Ill., May 9, 1918 (J. R. Malloch).

This species differs from any in the genus hitherto described in the exceptionally pale color of the abdomen. When alive the insect presents a peculiar appearance, the pale abdomen contrasting very strikingly with the black thorax.

NOTE ON NEUROPTEROIDS.

A number of new species and genera of American Neuropteroids were published in June of last year in "Memorias de la Real Academia de Ciencias y Artes,"* of Barcelona, Spain, by Rev. Longinos Navás, S. J., under the title "Neurópteros nuevos o poco conocidos." These are the species, with localities.

Perla uncinata Nav., Sonora, Mexico (J. Baumberger, through J. R. de la Torre-Bueno).

Nosatura Nav. new genus, type, *Perla carolinensis* Banks.

Isoperla truncata Nav., Yerington, Nevada.

Chrysopa hypsilon Fitch, var. *hœmatica* Nav., nov., White Plains, N. Y., May 31, 1915 (J. R. de la Torre-Bueno).

Parasemidalis nigriceps Nav., White Plains, N. Y., July 18, 1917 (J. R. de la Torre-Bueno).

Caborius Nav., n. n. for *Allophylax* Banks, preoccupied in Coleoptera, 1906.

J. R. T. B.

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* 2d ser., Vol. XIV, No. 4, pp. 339–366, separately paged, 1–30.

NEW SPECIES OF NORTH AMERICAN SIPHONAPTERA.

By Edward A. Chapin, Washington, D. C.

The insects here described represent the bulk of the indeterminate material that has come to the attention of the author during the past three years. The interest in Siphonaptera is gradually growing and much more attention is being given to the ectoparasites of our wild animals. Owing to the difficulties attending the gathering of fleas from birds, there are practically no bird fleas known from North America, but it is hoped that this deficiency in our knowledge will be satisfied in the near future.

In his classification of the fleas, Oudemans* places the genus *Spilopsyllus* Baker in the family Neopsyllidæ, as the type of a separate subfamily, the Spilopsyllinæ. The genus *Hoplopsyllus* Baker is not placed in the table at all. In order to place *Spilopsyllus* with the Neopsyllidæ, the antenna is characterized as long (*"Clava lang"*). This is certainly not the case in the antenna of the female and if the condition obtaining in the antenna of the male of a *Neopsylla* is taken into consideration, the male antenna of *Spilopsyllus* can not be called elongate. Therefore, I would relegate the genus to the family Archæopsyllidæ, near *Ctenocephalus* Kolen. The habitus of the genus *Hoplopsyllus* would cause it to be placed nearby. These three genera might be separated in the following manner.

Cephalic ctenidia lacking, pronotal ctenidium present, III coxæ with a comb of spines on the inner side.................. *Hoplopsyllus* Baker.
Cephalic ctenidia present.
    Club (third segment) of antenna incompletely segmented, that is, the segmental sutures are evident only on the posterior face. *Ctenocephalus* Kolen.
    Club of antenna with segmental sutures running completely around the organ .... *Spilopsyllus* Baker.

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* "Neue Ansichten über die Morphologie des Flohkopfes, sowie über die Ontogenie, Phylogenie und Systematik der Flöhe," Nov. Zoöl., XVI, 133–158, 1909.

There seems to be no valid reason to retain a separate subfamily for *Spilopsyllus* in its new position.

The species of *Neopsylla* Wagner are divided into three groups* by Rothschild on the basis of the arrangement of the plantar bristles of the fifth fore and mid tarsal segments and on the presence or absence of a row of short spines on the inner surface of the hind coxa. The species described below as new falls into group III. The following table will separate the known males of the species of this group.

Upper lobe of clasper larger than the lower..............*similis* sp. nov.
Upper lobe of clasper not larger than the lower.
  Outer margin of finger nearly straight, finger longer than distance from its attachment to tip of lower lobe..........*wenmanni* Roths.
  Outer margin of finger sinuate so that finger is suddenly wider near middle, finger not longer than distance from its attachment to tip of lower lobe ....*faceta* Roths.

The remaining species in this group, *testor* Roths., is known only from the ♀. It is evidently near to *faceta* Roths.

Hystrichopsylla schefferi sp. nov.

Head.—The frontal notch is small and low down in front. The frons bears two rows of bristles, the upper of nine, running from the base of the antenna to below the frontal notch and the lower of three heavier and longer bristles, from above the middle of the antennal groove to near the base of the maxillary palpi. There are about thirty small hairs scattered over the surface below the upper row of bristles. The eye is represented by a thickening in the chitin. The genal ctenidium is of seven spines, the middle spines much the longer, and occupies about the anterior third of the genal margin. The occiput bears three rows of hairs, the first row of eight small, the second row of eight larger, this row being interrupted between the third and fourth bristles from the antenna and a third row of bristles from the dorsal posterior margin of the head to the lower part of the post gena. Along the posterior margin of the antennal groove are many minute hair-like spines. The rostrum reaches four-fifths the length of the fore coxa.

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* Rothschild, N. C., On *Neopsylla* and some allied genera of Siphonaptera, Ectoparasites, I, 30–44, 1915.

Thorax.—The pronotum bears on its posterior margin a ctenidium of 46 spines and also five rows of bristles. The meso- and metanota bear many bristles roughly arranged in seven rows on each. The pleural plates bear a few longer bristles.

Abdomen.—The tergites are thickly set with many bristles, these not arranged in definite rows. The posterior margins of the third, fourth and sixth tergites bear combs of very short and thick spines, the numbers of the spines in the rows being 8, 4, 3. The antepygidial bristles are four on each side. Sternites III to VII are heavily armed with many bristles.

Legs.—The fore femur bears on the ventral (posterior) margin proximally a pair of bristles and near by, a single bristle. Distally, there is a row of six bristles which extends across the apex of the femur to the anterior apical angle. The spines of the anterior margin of the fore tibia are in nine groups, the numbers of spines in the groups are as follows: 2, 2, 1, 2, 3, 3, 1, 3, 3. At the posterior apical angle there are two groups of three spines each, the longest spine in the apical group nearly equaling the first segment of the tarsus. First tarsal segment with heavy bristles in eight groups, but as many of the spines are missing in the type and only specimen it is impossible to state the exact number. The plantar bristles of the fifth segment consist of five pairs, all lateral. The armature of the mid and hind legs is essentially like that of the fore leg. The apical row of bristles of the femora contains ten instead of six. The spines of the anterior margin of the mid tibia are grouped as follows: 2, 2, 3, 3, 4, 1, 4, 4, 3, and those of the hind tibia: 2, 2, 3, 3, 3, 1, 3, 1, 3, 3. Both posterior apical rows on the hind tibia have four spines. Plantar bristles as in the fore tarsus. The relative lengths of the tarsal segments are shown by the following table:

Tarsus.			Segments 1–5.		
I	26	15	10	7	15
II	40	25	15	8	20
III	70	55	31	17	23

Modified Segments.—The seventh sternite is produced on the sides posteriorly into a broad, truncate lobe, the base of the lobe is about six times its altitude. There are many heavy bristles on the sclerite. The eighth tergite is produced posteriorly into a clearly defined triangular process at the apex of which there are several long hairs. Many short hairs are placed along the margin. The stylet is cylindrical, about six times as long as broad and has toward the apex two long bristles and two sense cones. The receptacula seminis are two in number and are similar to the same organs in *H. dippiei* Roths., as figured by Fox.* The appendix is longer in comparison to the body in the present species than in *H. dippiei,* according to Fox's figure.

Length.—6.2 mm. (in a slightly contracted condition).

The type, a female, was taken from the nest of *Aplodontia rufa* Raf. at Puyallup, Washington, by Mr. T. H. Scheffer.

The genus *Hystrichopsylla* Tasch. up to the present contained but one Nearctic species, *H. dippiei* Roths. *H. schefferi* is a much larger species, and is further distinguished from *H. dippiei* by the difference in the number of spines in the pronotal ctenidium, there being thirty-six in the latter and forty-six in *H. schefferi.*

Stenoponia wetmorei sp. nov.

Head.—The frons bears five bristles, three in a vertical row near the margin of the antennal groove and two placed in such a way that they form, with the lowest bristle of the vertical row, a horizontal row beginning near the insertion of the maxillary palpi. On the upper part of the occiput there are four bristles and on the lower, in the posterior angle, there are five. The longest bristle of the second antennal segment equals the length of the third segment. The rostrum is short, equal in length to the maxilla. Eye absent. On the fore gena there is a ctenidium of twelve spines. The genal process is rounded and extends downward a distance equal to the length of the last spine of the ctenidium.

Thorax.—The pronotum bears on the posterior border a ctenidium of about fifty spines. Anterior to this ctenidium there are four rows of about twenty-four bristles each. The meso- and meta-thoraces each bear four rows of numerous bristles. There are about twenty bristles on the mesepisternum, fifteen on the mesepimeron, and four on the metepisternum. On the metepimeron there are two rows of bristles, the anterior one of eleven and the posterior one of fifteen.

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* U. S. Pub. Health Service, Hygienic Lab. Bull. 97, Pl. xix, fig. 52.

Abdomen.—The first abdominal tergite bears a ctenidium of forty spines, similar to the ctenidium on the pronotum. On the II–V tergites there are ctenidia. The spines forming these combs are very short and stout, quite unlike those of the others. The numbers of spines in order are forty, thirty-eight, thirty and twelve. There are also two well-defined rows of bristles on each tergite, with a few minute bristles scattered at random between the rows. The seventh tergite is continued over the pygidium in a long spine and bears at the base of this spine the antepygidial bristles, five on each side. Sternites III–VII bear a few bristles, as follows, the figures being for one side only: 5; 4–4; 3–1–2; 3–10; 5.

Legs.—The spines on the anterior (outer) margin of the tibiæ are unusually long and heavy. On leg II, the longest apical spine, situated at the outer angle, exceeds the first and second tarsal segments combined and is longer than the tibia itself. On leg III the longest apical spine is equal to some of the lengths of the first segment and one-third of the second. The apical spine of the first segment of tarsus III is equal to the second segment, while that of segment two equals segments three and four combined. There are four pairs of lateral plantar bristles and a fifth pair placed between the first laterals. The comparative lengths of the tarsal segments are as follows:

Tarsus.			Segments 1–5.		
I	12	9	8	6	12
II	25	14	9	6	14
III	40	27	15	8	14

Modified Segments.—The seventh sternite is narrowed posteriorly. The flaps of the seventh tergite are somewhat rectangular and bear ten bristles on the posterior margin. The eighth tergite bears at the upper part a row of eight heavy bristles, situated directly behind and under the antepygidial bristles. The stylet is short and cylindrical and bears at the apex one long bristle. The body of the receptaculum seminis is spherical. The appendix is of an equal diameter throughout and is curved about the body, the apex nearly reaching the middle of the body. At the opposite end of the body is a knob-shaped excrescence equal in height to the diameter of the appendix and about twice as broad across the base of attachment.

Length.—4 mm.

Described from one female, collected at Woodridge, D. C., December 3, 1917, off *Peromyscus leucopus noveboracensis* Fischer, by Alexander Wetmore, in whose honor it is named.

Stenoponia, as characterized, heretofore contained three species, the type, *tripectinata* Tirab. from the Mediterranean region, *cœlestis* Roths. from China and *gigas* Kirby from North America. The species described above is distinguished immediately from *gigas* Kirby by the difference in the genal ctenidium, being fourteen spines in case of *gigas*. The arrangement of bristles on the metepimeron is entirely different, most notably so in the posterior row; in *gigas* there are ten bristles, while in the present species there are fifteen. There are many other minor differences.

Doratopsylla blarinæ Fox, U. S. Pub. Health Ser., Hygienic Lab. Bull. 97, p. 11, pl. IV, figs. 1–3. 1914.

As this species was described from the ♂ only, the following description of the ♀ is offered.

Head.—The frons bears two rows of bristles, each of five. The first, third and fifth bristles of the lower row are very much heavier than the others. The occiput has three rows, the upper of four, the middle of six and the lower of six bristles. There are two small bristles on the posterior margin of the antennal groove. The eye is rudimentary. The last spine of the genal ctenidium is at the anterior edge of the antennal groove. The rostrum extends four-fifths the length of the fore coxæ.

Thorax.—The pronotum bears a ctenidium of sixteen spines, anterior to which is a row of nine bristles. The meso- and metanota bear two rows each of bristles. There are eleven bristles on the meso- and meta-pleural sclerites as follows: mesepisternum one, mesepimeron five, metepisternum one, metepimeron four.

Abdomen.—Tergites I–IV each bear at the upper part a pair of short, thick sharp teeth, one on either side of the dorsal median line of the abdomen. There are also two rows of bristles on each segment. Sternites III–VII bear bristles as follows: 2, 2, 2, 3, 6; the same figures repeated for the opposite side of the insect.

Legs.—The anterior margin of the fore tibia bears six groups of two bristles each. The mid and hind tibiæ have seven groups each, the third group being reduced to one bristle in each case. The longest apical bristle of hind tibia does not reach the apex of the first tarsal segment, but the longest apical bristle on both fore and mid tibiæ exceed the first tarsal segments of those legs. The comparative measurements of the tarsal segments are as follows:

Tarsus.	Segments 1–5.				
I	15	16	14	12	30
II	30	25	18	11	27
III	65	45	30	20	30

Modified Segments.—The seventh sternite is continued posteriorly at the ventral angle and its posterior margin is distinctly sinuate. The process of the eighth tergite is more or less triangular and bears on its superior margin four and on its inferior margin two heavy bristles. At the cephalad end of the inferior margin there is a brush of about six long flexible bristles. The stylet is cylindrical and bears at its apex one stout bristle. The eighth sternite bears eight long bristles and two short spines near the upper margin. The receptaculum seminis is large and oval. The juncture of the appendix with the body is poorly defined, the appendix at the base being the same diameter as the body.

Length.—2 mm.

Specimen described is one of a series of both sexes taken on Plummer Island, Maryland, off *Blarina brevicada* Say., March 10, 1918, Alexander Wetmore, collector.

Myodopsylla subulata sp. nov.

♂ *Head.*—The entire upper part of the frons is transparent and bears but three minute bristles near the antennal groove. The line of chitinization runs from the base of the posterior genal spine in a gentle curve to the upper fifth of the anterior margin of the antennal groove. On the dark (chitinized) part of the frons there are five stout bristles along the antennal groove and thirteen minute hairs scattered over the surface anterior to these. The eye is vestigial though visible, low down on the genal process which is sharply pointed behind. At the extreme anterior end of the fore-genæ there are four ctenidial spines, two on each side. The posterior pair are the longer and are curved backward. The rostrum is short, reaching about one-fourth the length of the anterior coxæ. The occiput bears nine bristles on either side and a row on the posterior margin of twelve. This marginal row ends well down on the post gena in a very long and heavy bristle.

Thorax.—The pronotum bears a ctenidium of forty-two spines on its posterior margin. There are about twelve bristles on each side of this sclerite. The mesonotum bears about nine bristles on a side in addition to a posterior marginal row of ten. The metanotum bears ten bristles on a side in addition to a posterior row of sixteen. The mesepisternum bears nine bristles and the mesepimeron three. The mesosternum is protuberant below and bears no bristles. The metepisternum is very small and bears four bristles, while the metepimeron is much larger, bearing nine. The metasternum is similar in form to the mesosternum but is somewhat larger.

Abdomen.—No abdominal tergite bears ctenidial spines. However, dorsally, the bristles of the posterior marginal rows become more numerous and form structures which are analogues of the pronotal ctenidium. The numbers of bristles in these rows for the first seven tergites are as follows: 14, 12, 8, 8, 8, 8, 4. The bristles, other than these on the tergites are as follows: On the first there are nine, arranged in two rows. On the remaining tergites there is one row of large bristles on each, as follows: 4, 6, 5, 6, 6, 5. There are no bristles on Sternite III. Sternites IV–VII bear the following on each side: 3, 3, 3, 6. The antepygidial bristles are one on each side, mounted on conical protuberances.

Legs.—The fore femur bears proximally one and distally two bristles on its ventral (internal) edge. On the dorsal edge, apically there is a prominent curved spinous bristle. The mid and hind femora are similar except that apically on the outer face there are three additional bristles on each. The tibiæ bear, on outer faces, conspicuous rows of bristles, one on each as follows: 4, 9, 11. The bristles along the anterior margin of the tibiæ are partly paired and partly single. There are eight groups on the fore-, eleven on the mid- and twelve on the hind tibiæ. The tarsi are quite hairy. The plantar bristles on the fifth segment of all the tarsi are similar. There are four pairs which are strictly lateral. In the interval between the second and third pairs there is a pair slightly displaced toward the median line and between the bristles of the second pair there is a pair still closer to the median line. The comparative lengths of the tarsal segments are as follows:

Tarsus.	Segments 1–5.				
I	6	6	5	3	7
II	15	11	7	4	8
III	21	13	8	4	8

Modified Segments.—The ninth sternite is narrow and bears on the ventral margin numerous bristles, dorsally there are many fine brushlike hairs. The process of the clasper is evenly curved above and below, the process is extended in a narrow rounded lobe at the apex, of which there are six bristles. The exopodite is roughly trapezoidal in shape. The upper proximal corner is produced into a long slender process. The longest diameter of the exopodite measured from the apex of this process has a ratio of 50–32 to the diameter taken at right angles to this.

♀ *Head.*—Similar to the ♂.

Thorax.—Essentially similar to the ♂.

Abdomen.—Sternites III–VII bear the following numbers of bristles: 5, 4, 4, 4, 8. The tergites II–VII bear the following prominent bristles: 3, 3, 5, 5, 5, 4.

Legs.—Essentially similar to the ♂.

Modified Segments.—The seventh sternite is produced a short distance posteriorly. The eighth tergite bears a row of four bristles on its posterior margin. The stylet is cylindrical, of even diameter throughout the basal half, when it is suddenly reduced to about two-thirds the size. It bears at the apex a long bristle and, below this, two shorter ones. The body of the receptaculum seminis is spherical. The appendix is cylindrical and is bent partially about the body.

Length.—♂ 2.03 mm., ♀ 1.97 mm.

6 ♂, 6♀ from Hamden, Conn., off *Myotis subulatus* Say., collected January 9, 1915, by the author.

The bat-infesting fleas of the Nearctic region have been badly neglected. Up to the present there have been three species named. The first, *insignis* Roths., off *Myotis lucifugus** was described from Canada (Waterloo, Ontario). The second, *crosbyi* Baker, was very insufficiently characterized and is questionably distinct from *insignis*. The third species, *texana* Fox, is off *Nyctinomus mexicanus* from Texas (Pecos).

The present species is nearest to *insignis*, from which it differs in the shape of the exopodite and in the number of spines in the pronotal ctenidium. Also there are no short teeth on the mesonotum as in *insignis*. The ratio as given above for the exopodite appears to be 50–40 for *insignis*.

Neopsylla similis sp. nov.

Head.—The frons bears two rows of bristles, the upper of five and the lower of four, which are distinctly stouter. The occiput bears three rows, of four, five and three bristles respectively. The upper half of the posterior margin of the antennal groove bears three minute bristles. The rostrum reaches about two-thirds the length of the fore coxa. Eye rudimentary.

Thorax.—The pronotal ctenidium is of 12 rather broad spines; there is also one row of bristles on the pronotum, the most ventral being the longest.

Abdomen.—The tergites bear two rows each of bristles, the anterior row being the heavier. Sternites III–VII bear bristles as follows: 4–8; 4–8; 4–4–9; 8–9; 6–4.

Legs.—The hind coxa bears internally a nearly continuous row of seven short spines, the distal three becoming successively thinner. There are also eight hairs grouped about this comb. On the ventral margin of the mid femur at the proximal end is one bristle and at the distal end there are two, these last being on the outside face. On the ventral margin of the hind femur

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* In the original description, the host is cited as *Myodes lucifugus*. As the genus *Myodes* (Muridæ: Microtinæ) would not normally carry fleas of this group, and as the specific name strengthens the case for *Myotis*, I have made the change.

proximally there are four bristles, two outside and two inside, and distally there are two outside. Both the mid and hind tibiæ bear two lateral rows of bristles as follows: mid tibia, lateral row nearest dorsals, 6, second row, nearly median, 5; corresponding rows on hind tibia, 6, 5. On both tibiæ there is a short row distally just inside the anterior margin of 5 and 6 respectively. The tarsal segments bear the following comparative measurements:

Tarsus.	Segments 1–5.				
I	20	18	13	11	30
II	36	27	16	13	31
III	65	45	30	16	36

The longest apical tibial bristle of the hind leg reaches the apex of the first tarsal segment, but none of the apical bristles of the first or second segments reach the apex of that following. The fifth segment of the anterior and mid tarsi have each four pairs of lateral and additional pair placed between the proximal laterals. The fifth segment of the hind tarsus has but four pairs, all lateral.

Modified Segments.—The eighth sternite bears on each side eleven bristles, of which three are longer and heavier than the others. The process of the clasper is bilobed, the upper lobe nearly twice as long as the lower, which is nearly as long as broad and is truncated parallel with its base. Each lobe bears one heavy bristle near its outer margin. There are about forty smaller hairs on the two lobes. The exopodite bears no heavy bristles, but has about fifteen hairs along its outer margin. Upward it is produced to a rather sharp point. The ninth sternite bears at the apex a row of spines, apparently four in number; however, all are undoubtedly double. Proximally to this row are apparently four more; the first three are double. This last row is continued with a few weaker bristles, three in number.

Length.—1.57 mm. Type in collection of the author.

One ♂ from Lake Burford, N. M., off *Peromyscus* sp., collected May 25, 1918, by Alexander Wetmore.

This species was taken in connection with large numbers of *Ceratophyllus wagneri* Baker, which appears to be an abundant parasite of this host.

Ceratophyllus utahensis sp. nov.

Head.—The frontal notch is high up. There are two rows of three bristles each on the frons, the lower row running from above the eye to the base of the maxilla, the upper from a point midway between the eye and the top of the head and the base of the maxillary palp. There are three minute bristles above the eye and two more, slightly larger, on the anterior margin of the antennal groove near the base of the antenna. The entire head is sparsely but regularly punctured; however, there are no visbile hairs arising from these punctures. The eye is very large, overlaps the antennal groove near the upper part and nearly touches the genal margin. Its diameter (vertical) is equal to the length of the third segment of the maxillary palp. The gena behind the eye is sharply pointed. The first segment of the antenna bears numerous small hairs and the hairs arising from the second segment reach the tip of the antenna. On the occiput there are three stout bristles, one appearing as a continuation of the upper row on the frons and two as a continuation of the lower row. There is one large bristle at the lower posterior angle of the occiput and a subbasal row of about ten across the dorsal part.

Thorax.—The pronotum carries a ctenidium of about 26 spines on the posterior margin, and a row of about 12 bristles anterior to this. On the mesonotum there is a submarginal row of 10 bristles and two rows of much smaller bristles before this; on the metanotum the submarginal row is of nine bristles and there are three rows of smaller bristles. On the mesosternum there are two bristles, on the mesopleuræ, five. On the metasterum there is one bristle near the upper posterior corner, the metepisternum bears two and the metepimeron five.

Abdomen.—Tergites I–IV bear near the dorsal line on each side two short heavy teeth. In addition, there are two rows of bristles on each tergite; the numbers for one side only are as follows:

	I	II	III	IV	V	VI	VII
1st row	6	6	7	7	6	6	2
2d row	4	6	6	7	7	6	6

On the first tergite there is one bristle on each side representing a third row. Sternites III–VII bear bristles as follows: 3, 6, 7, 6, 10. The antepygidial bristles are three on a side, the middle bristle very large and strong, while the laterals are so weakly developed as to be hardly visible.

Legs.—On the inside of the hind coxæ there are a few hairs, similar to those in *C. arctomys* Baker. The fore coxa bears numerous bristles on its outer surface. On the mid and hind coxæ the bristles are confined to the distal anterior portion of the outer face. The bristles on the exterior edge of the tibiæ, especially in the case of tibia III, are fewer than usual and none of the apical bristles of tibia III reach the apex of the first tarsal segment. Two apical bristles of tibia II reach the apex of the first tarsal segment of that leg. There is one apical bristle on the third segment of Tarsus III which reaches the apex of the fourth segment. The first segment of tarsus I bears three large bristles on the outer edge. The comparative measurements of the tarsal segments are as follows:

Tarsus.			Segments 1–5.		
I	22	25	20	12	37
II	35	35	25	15	40
III	85	65	38	22	45

Plantar bristles five pairs, all lateral.

Modified Segments.—The eighth tergite has four heavy marginal bristles, and five lateral. The sclerite is sharply emarginate posteriorly. The eighth sternite is prolonged posteriorly and has near the tip a group of five large bristles. There are numerous smaller bristles near the lower margin. The fixed process of the clasper is enlarged near the middle and is then contracted to a blunt apex. The movable process is oblong, rounded at apex, nearly twice as long as the fixed process and bears at the posterior apical angle five thin bristles. At the juncture of the two processes there are the two bristles so often found in this genus. The ninth sternite bears many small hairs. Female essentially similar to the male. The lateral antepygidial bristles are more fully developed in this sex but are less than one-fourth as long as the mid-bristles.

Modified Segments.—The eighth tergite is slightly emarginate near the apical angle. The stylet is about twice as long as thick at the base. The receptaculum seminis is constricted at the juncture of the appendix and the body. The appendix is slightly enlarged near the juncture and then becomes cylindrical. The ventral edge of the body is evenly curved while the dorsal edge is sinuate.

Length.—♂ 2.28 mm. ♀ 2.71 mm.

Locality.—Mouth of Bear River, Utah, off either *Steganopus tricolor* or *Spatula clypeata,* 22 July, 1916, Alexander Wetmore collector. The specimens were taken from a container in which both of the above named birds were imprisoned. Evidence points to *Steganopus* as the true host.

TRAPPING FOR LARVÆ OF APANTESIS.

By Chas. Rummel, Newark, N. J.

On a trip to Lyons Farm, on November 11, 1918, to collect larvæ of *Bellura obliqua,* a sufficient number were secured by cutting off about 60 infested sections of cat-tail. Plants bearing the matured seed stalk or "cat-tail," it has been my experience, are not infested by *B. obliqua.*

With time still to spare search was then made for *Apantesis* larvæ. On a previous visit when a larva of *A. nais* was found in a swampy, wet place, an unusual environment for this species; traps (old paper and other rubbish found near at hand), had been placed on the border of this swamp. Examination of these traps resulted in three larvæ of *A. nais* and four very small ones of a kind not recognized. After adding a number of traps search was continued on the way back toward Newark. About an hour later in an open field six more half-grown larvæ of *A. nais* and one full grown of *A. arge* were found. Here again a number of traps were laid, this time old sheet iron being the material available. If the material used for traps is light, such as paper or pasteboard, it should be weighted down so that the wind cannot blow it away. It is best to crumple paper and secure it between stalks of grass and weeds. This will prevent the paper from settling and at the same time give the larvæ a chance to get into the folds. Heavy material, such as sheet-iron, wood, or stones should be laid down hollow. By this method of collecting the writer secured the following species of *Apantesis* larvæ: *anna* and var. *persephone, arge, nais, vittata, radians* and *phalerata*. *Anna* and *vittata* inhabit dry woodland; *arge* and *nais* open dry, grass covered fields; *radians* and *phalerata* wet, swampy places and even salt meadows, their larvæ feeding upon the salt meadow grasses. The first part of November and again in the spring have proven most favorable for collecting larvæ of the above mentioned species.

A LIST OF THE BUPRESTIDÆ AND CERAMBYCIDÆ TAKEN ON LONG ISLAND, N. Y.

By Allan S. Nicolay, New Brunswick, N. J.

(*Continued from page 20.*)

CERAMBYCIDÆ.

Orthosoma Serv.

O. brunneum Forst. Common throughout the scrub oak sections, June–August. Taken under bark, but most often seen at light. *Derobrachus spadix* Csy., described from Long Island, is a synonym.

Prionus Geoff.

P. laticollis Drury. Common everywhere, July–August.

P. pocularis Dalm. Yaphank, August 26; two females, one at light (Davis): Bayshore, August 5 (Olsen): Bellport, July 30–August 21 (Nicolay). Breeds in pine logs, adults generally taken at light.

Asemum Esch.

A. moestum Hald. Rockaway Beach, May–June (Shoemaker): Wyandanch, May (Schott): Bellport, June (Nicolay). Not rare.

CRIOCEPHALUS Muls.

C. obsoletus Rand. Rockaway Beach, June (Olsen): Fire Island, July (Schott) Bellport, August. Three specimens, two in spider's web in garage near bay, the third taken from mast of sail boat (Nicolay).

PHYSOCNEMUM Hald.

P. brevilineum Say. Montauk Beach, July (Schott): Yaphank, June 11. A single specimen collected on a scarlet oak, recently felled. Wading River, June 1 (Davis): Wading River, June 23. Rare on dead oak twigs (Nicolay).

HYLOTRUPES Serv.

H. bajulus Linn. Rockaway Beach, July (Davis): Flatbush, July (Schott): Bellport, July 12–August 16 (Nicolay). On pine.

PHYMATODES Muls.

P. variabilis Fabr. Generally distributed, common, June–July. Sometimes met with in great numbers flying just before dusk.

P. amœnus Say. Rockaway Beach (Shoemaker): Wyandanch, May (Schott): Wading River, May 29 (Davis).

P. lengi Joutel. East New York, May–June. Knocked off grape (Shoemaker).

P. lividus Rossi. Brooklyn. Hatched by Linell from barrel staves of imported casks (Leng).

P. dimidiatus Kirby. Rockaway Beach, June 4 (Shoemaker): May (Schott). In wash up along beach.

P. varius Fabr. Wading River, May 29. Orient, Sept. (Davis): Massapequa, May 25, Rockaway Beach, June (Shoemaker): Bellport, June 12. On oak sap (Nicolay).

CALLIDIUM Fabr.

C. antennatum Newm. Rockaway Beach, May 14 (Davis): Rockaway Beach, May–June (Shoemaker & Schott).

C. schotti Schaef. Huntington. Type locality.

C. violaceum Linn. (*janthinum* Lec.). Rockaway Beach (Davis & Shoemaker).

C. frigidum Casey. Yaphank, May 17. In cut cedar branch lying on the ground (Davis).

C. æreum Newm. Brooklyn, June (Schott).

OEME Newm.

O. rigida Say. Flatbush, July (Schott): Rockaway Beach, June–July. Three specimens in wash up (Shoemaker).

STROMATIUM Serv.

S. pubescens Hald. Long Island. From Miss Emily Morton's collection and now in the collection of Col. Wirt Robinson (Davis).

EBURIA Serv.

E. 4-geminata Say. Parkville about 1876 (Leng).

ROMALEUM White.

R. simplicicolle Hald. Bay Shore (Olsen).

R. atomarium Drury. Wading River, July 25. Attracted to light (Davis): Rockaway Beach, July. In wash up (Schott): Bellport, July 23–August 15; beneath hickory chips, clinging to the under side (Nicolay).

R. rufulum Hald. Jamaica (Pearsall): Smithtown, August (Schott): Yaphank, July (Davis).

ELAPHIDION Serv.

E. mucronatum Fab. East New York (Shoemaker): Half-Way-Hollow Hills, July 4 (Davis).

E. incertum Newm. Yaphank, Sept. 5 (Davis): Bellport, Sept. 6. A single specimen under oak logs (Nicolay).

E. villosum Fab. (*parallelum* Newm.). Common everywhere beating oak, in wash up, and at light.

E. subpubescens LeConte. Rockaway Beach, Central Park, Wyandanch, Yaphank, Deep Pond, Wading River, May 14–July 13 (Davis).

E. unicolor Rand. Central Park, Yaphank, July (Davis): Cypress Hills, July (Shoemaker): Bellport, August 17. Beating scrub oak (Nicolay).

E. cinerascens LeConte. Massapequa, May 23. Beating bushes (Shoemaker): Jamaica, Rosedale, July (Schott).

HETERACHTHES Newm.

H. 4-maculatus Newm. Aqueduct, June (Shoemaker).

H. ebenus Newm. Rockaway Beach, May 25, Wyandanch, July 1 (Davis): Montauk Beach, July (Schott): Bellport, July 15. At light (Nicolay).

PHYTON Newm.

P. pallidum Say. Aqueduct, July. Beating oak (Shoemaker & Davis).

OBRIUM Serv.

O. rufulum Gahan. (*rubrum* Newm.). Flushing, August 30 (Davis).

MOLORCHUS Fab.

M. bimaculatus Say. Yaphank, May 17. On *Armia* flowers (Davis): Brooklyn, May 22 (Shoemaker): Bellport, June 7. Sweeping (Nicolay).

ELYTROLEPTUS Dugès.

E. floridanus LeConte. Massapequa, May 23. Rockaway Beach, June 4 (Shoemaker): Central Park, Pine Lawn, Yaphank, Deep Pond, May 18–June 16 (Davis): Bellport, June. Not common. Wading River, June 23. Very plentiful on leaves of new oak shoots, which grow from stumps of felled trees (Nicolay).

TRAGIDION Serv.

T. coquus Linn. Yaphank, Sept. 3 (Shoemaker).

PURPURICENUS Serv.

P. humeralis Fab. Rockaway Beach, June 26 (Davis): Mastic, June 18 (John Nichols).

BATYLE Thom.

B. suturalis Say. Aqueduct, July (Shoemaker).

STENOSPHENUS Hald.

S. notatus Oliv. Rockaway Beach, May 14. Half-Way-Hollow Hills, July 2 (Davis): Yaphank, May (Schott).

CYLLENE Newm.

C. pictus Drury. Brooklyn, May 5. One specimen on sidewalk (Nicolay).

C. robiniæ Forst. Common in the fall on golden rod, breeding in locust.

CALLOIDES LeConte.

C. nobilis Say. Rockaway Beach, June 6; Wyandanch, July 3 (Davis): Montauk Point, July 2. Common in wash up (Schott): Bellport, Wading River, June. Not rare around oak (Nicolay).

ARHOPALUS Serv.

A. fulminans Fab. Rockaway Beach, June (Shoemaker): Jamaica (Pearsall).

XYLOTRECHUS Chev.

X. colonus Fab. Common, May–August.

X. sagittatus Germ. Wading River, July 26 (Davis): Wyandanch, July (Schott): Bellport, August 8. On dead pine (Nicolay).

EURYSCELIS Chev.

E. suturalis Oliv. One specimen flew into Schaupp's window (Brooklyn), doubtless hatched from tropical lumber (Leng).

NEOCLYTUS Thom.

N. erythrocephalus Fab. Everywhere on Island, common May–July.

CLYTANTHUS Thom.

C. ruricola Oliv. Wading River, May (Davis): Jamaica (Pearsall).

CYRTOPHORUS LeConte.

C. verrucosus Oliv. Yaphank, May 17 (Davis): Bellport, June 16–27. On oak (Nicolay).

TILLOMORPHA Blanch.

T. geminata Hald. Bellport, June 15 (Nicolay).

DISTENIA Serv.

D. undata Oliv. Taken on Long Island (W. S. Fisher).

DESMOCERUS Serv.

D. palliatus Forst. Elmhurst, August (Howarth Boyle).

RHAGIUM Fab.

R. lineatum Oliv. Yaphank, May 7. Wyandanch, larvæ workings and pupa cocoons under bark of pitch pine, April (Davis).

CENTRODERA LeConte.

C. picta Hald. Collected on Long Island by C. J. Martin (Davis).

ACMÆOPS LeConte.

A. discoidea Hald. Massapequa, June 5. On pine. Rockaway Beach, May 25 (Shoemaker): Wading River, May 29 (Davis).

GAUROTES LeConte.

G. cyanipennis Say. A single specimen of this insect, which is usually taken in the mountains, was collected at Deer Park in May by Mr. Schott.

STRANGALIA Serv.

S. famelica Newm. Wyandanch, July 1; Half-Way-Hollow Hills, July 2 (Davis).

S. acuminata Oliv. Yaphank, June 10, July 8 (Davis).

S. luteicornis Fab. Common in July on flowers, chiefly on wild rose.

TYPOCERUS LeConte.

T. velutinus Oliv. Everywhere, June–August.

LEPTURA Serv.

L. emarginata Fab. Yaphank (Weeks).
L. lineola Say. Common on flowers, May 30–June.
L. hæmatites Newm. Yaphank, June 10 (Davis).
L. nitens Forst. Common, May 17–July 20.
L. rubrica Say. Pinelawn, August 11; Wyandanch, June 28 (Davis).
L. circumdata Oliv. Wyandanch, July 1; Yaphank, June 10 (Davis).
L. vittata Germ. Abundant, June 10–July.
L. mutabilis Newm. Yaphank, July 10 (Davis).

CYRTINUS LeConte.

C. pygmæus Hald. Yaphank, July. Greenport, August 4 (Davis): Bellport, July 25. Wading River, June 23. Not rare, beating scrub oak, but difficult to see in umbrella because of its small size, activity, and resemblance to ants (Nicolay): Massapequa, Aqueduct, July (Shoemaker).

PSENOCERUS *LeConte.*

P. supernotatus Say. Everywhere taken sweeping, May 17–June 30.

MONOHAMMUS Serv.

M. titillator Fab. Common in the pine sections and wash up on shore, June 26–Sept. 10.

GOËS LeConte.

G. tigrina DeG. East New York, July–August. On white oak (Shoemaker).
G. pulchra Hald. Flatbush (Engelhardt).
G. debilis LeConte. East New York (Shoemaker): Bellport, July 17 (Nicolay).
G. tesselata Hald. Central Park, July (Schaeffer).

G. pulverulenta Hald. East New York, July. On scarlet oak (Shoemaker).

ACANTHODERES Serv.

A. quadrigibbus Say. One found on corn stalk at the edge of a field surrounded by woods in Parkville (Leng).

A. decipiens Hald. Central Park, June 29 (Shoemaker): Yaphank, August 26, July 31 (Davis): Wading River, June 23. Beating live oak (Nicolay).

LEPTOSTYLUS LeConte.

L. aculiferus Say. Jamaica (Pearsall).

L. biustus LeConte. East New York (Shoemaker): Shelter Island, August 3; Orient, Sept. (Davis).

L. sexguttulus Say. Wading River, July 23 (Davis): East New York, July 6; Rockaway Beach, June 11; Central Park, June 299 (Shoemaker): Bellport, July 17–August 21. Sweeping borders of salt marsh (Nicolay).

L. collaris Hald. Jamaica (Pearsall).

L. macula Say. Common, June 23–July.

LIOPUS Serv.

L. variegatus Hald. Flatbush, July 17. On hickory (Shoemaker): Yaphank, July (Davis): Wading River, June 23. In wash up (Nicolay).

L. crassulus LeConte. Yaphank, July (Davis).

L. alpha Say. Not rare, July–August.

L. punctatus LeConte. Half-Way-Hollow Hills, July 2; Yaphank, July 14; Riverhead (Davis).

DECTES LeConte.

D. spinosus Say. Bellport, July 25 (Nicolay). The species described by Casey from Long Island under the name *brevis* should be placed in synonymy.

LEPTURGES Bates.

L. signatus LeConte. Jamaica (Pearsall).

L. querci Fitch. Taken everywhere, July–August. Beating dead oak branches and in wash up.

HYPERPLATYS Bates.

H. aspersus Say. Common, May 23–Sept. 1.

GRAPHISURUS Kirby.

G. fasciatus DeG. Rather common, July–August. Beating dead branches and at light.

CERATOGRAPHIS Gahan.

C. biguttata LeConte. Oakdale, August 4. Very rare, a single specimen beating dying pine tree (Schott).

ACANTHOCINUS Steph.

A. obsoletus Oliv. Rockaway Beach, July 3 (Shoemaker): Bellport, July 21. On dead pine (Nicolay). Always rare.

A. nodosus Fab. Bay Shore, July 22 and August 5. Two specimens (Olsen).

POGONOCHERUS Latr.

P. mixtus Hald. Massapequa, June–August (Shoemaker).

ECYRUS LeConte.

E. dasycerus Say. Common, June–July. In wash up and on chestnut and oak.

EUPOGONIUS LeConte.

E. tomentosus Hald. Riverhead, August 20 (Davis): Bellport, July 22. Beating dead pine needles (Nicolay).

E. vestitus Say. Jamaica (Pearsall): Aqueduct, July 14 (Shoemaker).

ONCIDERES Serv.

O. cingulata Say. Hempstead, Sept. 4 (Olsen): Jamaica (Pearsall).

HIPPOPSIS Serv.

H. lemniscata Fab. Maspeth, Aug. 14 (Olsen): Jamaica. Bred from dry stems of *Rudsickia,* larvae January 3, adults June 6 (Pearsall).

SAPERDA Fab.

S. obliqua Say. Maspeth, June 10 (Doll).

S. calcarata Say. Brooklyn, August 10–25. On *Populus alba* (Davis, Shoemaker, Woodruff, and Schott).

S. candida Fab. Massapequa, East New York, July (Shoemaker): Bellport, July 4 (Nicolay).

S. discoidea Fab. Aqueduct, July 14–27. Once common on hickory (Davis and Shoemaker).

S. unicolor Joutel. Wyandanch, July 3; Yaphank, May 17. On poplar (Davis).

S. lateralis Fab. Wyandanch, July 1; Yaphank, June 9, July 11 (Davis): Jamaica (Pearsall).

S. concolor LeConte. Central Park, May 25. Bred from poplar (Shoemaker).

OBEREA Muls.

O. bimaculata Oliv. Common, June 23–July.

O. bimaculata var. *basalis* LeConte. Half-Way-Hollow Hills, July 4 (Davis): Richmond Hill (Lagai): Bellport, June 24–August 17 (Nicolay).

O. ocellata Hald. Jamaica (Pearsall).

O. tripunctata Swed. Jamaica (Pearsall).

O. tripunctata var. *myops* Hald. Jamaica (Pearsall).

O. tripunctata var. *mandarina* Fab. Common, June–Sept.

O. ruficollis Fab. Jamaica (Pearsall).

TETRAOPES Serv.

T. canteriator Drap. Very abundant on milkweed, July–August.

T. tetraophthalmus Forst. With preceding and even more plentiful.

There is in the collection of Mr. C. W. Leng a Longicorn called *Cœlosterna punctata*, supposedly an Asiatic species, a living specimen of which was found at Babylon and brought to Mr. Luetgens by a fellow boarder about twenty-five years ago.

Recapitulation.

	Species.	*Varieties.*
Buprestidæ	41	1
Cerambycidæ	118	3
	159	4

EDITORIAL.

THE BULLETIN, A PROGRAMME.

Stagnation is retrogression. Life is ever forward movement. An essential condition of success is a divine dissatisfaction and an unceasing striving for improvement, with perfection as the ultimate goal.

The course of our Bulletin has been steadily upward till it has reached its present level. To coördinate its effort for progress and make it a telling force, the publication committee has adopted a definite policy. Essentially, our publication is designed to serve the Brooklyn Entomological Society and to be its organ of outward expression.

First, as an essential to all publications is a wide circle of readers, we will, from time to time, publish articles of a wide general appeal, not exclusively directed to the technical entomologist, but rather to that wider reading public whose support would be an added source of strength. In technical matter, we purpose to publish in this order of preference: The Long Island fauna—monographs, ethology and biology, new species, fauna and distribution; the State of New York will next be considered, similarly divided as to subject matter; and then we will extend to the United States as a whole, to North America, to South America; and to other geographical regions.

So far as possible, in equity, preference will be given to articles by members of the society and by those who show their interest by subscribing to our publication, thus helping us to bear the burden of the cost.

As our subscription list grows and our operating income with it, this publication will also grow and we will be able to publish longer and more important articles.

At present, we want the shorter biological notes of which every entomologist has an abundance, if only he will remember that although to him they may seem trifles, trifles make perfection, as Michael Angelo said, and that perfection is no trifle.

J. R. T. B.

THE NEW YORK STATE LIST OF INSECTS.

The work on this catalogue of the insects of New York is progressing somewhat slowly, due, perhaps, to a very natural desire to make it an altogether worthy effort.

At a recent meeting of the Board of Editors, it was determined to encourage the publication of local lists, annotated, of course, since a bare list of names while serving to indicate distribution and useful to that degree, leaves untouched the deeper ethological and distributional problems.

The Bulletin is anxious to coöperate as far as possible in this great work, as is shown by the list of Long Island Cerambycidæ in this number.

Perhaps, however, more detailed and informational lists of smaller groups might lead to broader results. In any case, we are looking for these lists and will be glad to be able to publish one in every number, provided it be not too extensive. Long Island entomologists are especially urged to coöperate in this important work.

J. R. T. B.

TO OUR AUTHORS.

The Bulletin believes that coöperation and harmony are the absolute essentials to the progress of entomology. Life is too short to waste time in contention and strife. For these reasons, it will always be willing to help in anything that makes for unity, and, therefore, progress.

With this in mind, it has adopted as its own the rules for publications which appeared in the Proceedings of the Washington Entomological Society in the number for January, 1918 (appeared in December).

We make an exception, as did *Entomological News*, in regard to rule 4, since short notes, comments or editorials by the editor himself will be merely initialled. All other articles will bear the author's full name and address.

We do not republish these rules and suggestions in full, since authors have doubtless secured them ere this. If not, they should apply to the Washington Entomological Society for a copy.

J. R. T. B.

PROCEEDINGS OF THE BROOKLYN ENTOMOLOGICAL SOCIETY.

Meeting of January 16, 1919.—Officers for 1919 were elected as follows: Mr. W. T. Bather, president; Mr. W. T. Davis, vice-president; Mr. C. E. Olsen, treasurer; Mr. J. R. de la Torre Bueno, corresponding secretary; Mr. G. Franck, curator; Mr. A. C. Weeks, librarian; Dr. J. Bequaert, recording secretary; Mr. J. R. de la Torre Bueno, C. Schaeffer and G. P. Engelhardt, publication committee. The resignation of Dr. Lagai was accepted.

Scientific programme: Mr. C. Schaeffer shows many Long Island beetles, a list of which will be published in the Bulletin. Mr. Davis exhibits beetles from Gardiner's Island, off the coast of Long Island, N. Y.; among them are seven species of tiger beetles: *Cicindela purpurea, C. repanda, C. hirticollis* and var. *rhodensis, C. tranquebarica, C. punctulata, C. sexguttata* and *C. marginata.* Mr. Notman collected many interesting beetles at Yaphank, Long Island; among them *Hetærius blanchardi* Leconte (named by Mr. C. Schaeffer) taken in a nest of *Formica sanguinea subintegra* Emery (named by Dr. Bequaert).

Meeting of February 13, 1919.—Mr. C. Schaeffer is replaced on the Publication Committee according to the By-Laws by Dr. J. Bequaert, secretary. The resignation of Mr. Wasmuth was accepted.

Scientific programme: Mr. Engelhardt reviewed the systematic position of the Ægeriidæ, especially of the western forms. Aside from species of economic importance, as yet the foodplants of a few only are known. The speaker has bred all but two of the eastern forms. Comparison of eastern, western and Pacific Coast material clearly indicates that many Ægeriids now ranking as species would find a more natural grouping if placed as sub-species or geographical races under a recognized parent form. As illustrating this statement the following species, among others were shown: *Podosesia syringæ* and its western form *P. fraxini; Sanninoidea exitiosa* (eastern specimens), *S. graefi* (Rocky Mountains), and *S. opalescens* (Pacific Coast); *Sesia rileyi* in a form from Virginia and in another form from Colorado. Dr. Bequaert comments upon a Psammocharid, *Agenia brevis* Cresson, in which Mr. N. Banks has discovered a well developed psammophore of recurved bristles on the gula; the specimen shown was collected at Springs, Long Island, N. Y., August 16, 1918, and kindly named by Mr. N. Banks.

BOOKS.

Forced Movements, Tropisms, and Animal Conduct. By Jacques Loeb, M.D., Ph.D., Sc.D., etc. J. B. Lippincott & Co., $2.50.

This is the first volume of the series of monographs on experimental biology, which this firm is publishing under the editorship of Dr. Loeb, Prof. T. H. Morgan, of Columbia, and Prof. W. J. V. Osterhout, of Harvard. The chief interest of this monograph to entomologists lies in the experimental work based on the observed reactions of insects to external stimuli. Wherein the work relates to facts, it depends for accuracy on the reliability of the original experimenter. The hypotheses dependent on these facts are Dr. Loeb's own, and doubtless will be much controverted by other specialists. The final philosophy to which it all tends is beyond the realm of the observer of insects, whose working time is far too brief to hope to test the infinity of facts and phenomena that daily present themselves in his work. To a field entomologist it might seem that the artificial experimental conditions might tend to vitiate the reactions of the insects, and that the necessarily restricted numbers as well as the comparatively few forms used in experimentation are scarcely sufficient to draw final conclusions from. However we may regard this work, it assuredly points the way to the working entomologist for most significant and fascinating experimentation and observation.

The second volume to appear of this series, *The Elementary Nervous System,* by G. H. Parker, Sc.D., has just reached us. It is not of direct appeal to the entomologist, of course, since it relates to the lower forms of life only, without reference to the articulata, but all those interested in the broader field of biology will find it excellent.

Animal Parasites and Human Disease. By Asa C. Chandler, M.S., Ph.D. John Wiley & Sons, $4.50.

Perhaps no branch of entomology has so suddenly and so vividly reached the public consciousness as that which deals with the conveyance of disease by insects. In this book Mr. Chandler studies first the *animal* diseases carried by insects, and then their effect on human beings; and in the second part, the insect intermediate hosts and the ways of transmission of the parasites. The entomologist who wishes to keep abreast with the newest, most progressive side of entomology will find this work well worth reading.

J. R. T. B.

DESIDERATA ET OFFERTA.

I COLLECT for cash local Insects in all Orders. Printed price list of nearly 1,000 species Coleoptera in Henshaw Nos. A. H. Manee, Southern Pines, N. C.

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WANTED.—2d 3d, 4th, 8th, 9th Annual Report of the Entomological Society of Ontario. Will pay a reasonable price for any of the above reports. Jos. I. Beaulne, 3653 Notre Dame East, Montreal, Canada.

WANTED.—19th Illinois Entomological Report; Coleoptera of Southern California, by H. C. Fall; Notes on Lachnosterna of Temperate North America, by John B. Smith; Works of Thos. Say, Le Conte edition. Joe S. Wade, U. S. Bureau of Entomology, Washington, D. C.

WANTED.—North American Orthoptera from localities which are little known or in which but little collecting has been done. Material from the mountainous regions of the West particularly desired. M. Hebard, Academy of Natural Sciences, Philadelphia, Pa.

WANTED.—Sphingidæ from any part of the world. Will purchase or exchange. B. Preston Clark, 55 Kilby St., Room 35, Boston, Mass.

WANTED for cash—Ova of Catocalæ with or without parent moth. Address George J. Keller, 191 Avon Ave., Newark, N. J.

WANTED.—Imagos of *Saperda candida, Pholus pandorus,* all stages of *Macrodactylus subspinosus* except imagos, and other material of economic importance. Ward's Natural Science Establishment, 84 College Ave., Rochester, N. Y.

WANTED.—All kinds of material for Life Histories. Lepidoptera, Coleoptera, Hymenoptera, Diptera, etc., etc. Herman H. Brehme, Box 432, South Amboy, N. J.

Wanted.—Lintner's Injurious Insects, 1886 and 1887 (Rep. 3 and 4). N. Y. Park Rep. 1873–1896. Jour. Appl. Microscopy, I^{9}. Monthly Bul. Calif. Com. Hort., I$^{8-10}$; II$^{3-5}$; IV^{3}. Send stamp for list of publications for sale or exchange. Philip Dowell, Port Richmond, N. Y.

BARGAIN.—Splendid collection of Lepidoptera (about 1,500 specimens), from all parts of the world; mostly in Denton's patent tablets; oak case; suitable gift for school, institution or collector; $150, value $500. —Wimmer, City Court, 32 Chambers St., New York City.

JAMES SINCLAIR, dealer in RARE INSECTS, Los Angeles, Cal., offers many rare species, such as *P. pergamus, P. indra, P. brevicauda, P. Pregonia, Cossus centerensis* and many others. List Free.

WANTED—in series for cash of exchange—beetles of the genus *Serica* (Scarabæidæ) from all parts of North America. *Cicindela lincolniana* Casey among the exchanges offered. R. W. Dawson, Department of Entomology, University Farm, Lincoln, Nebraska.

FLORIDA Insects of all orders, also Fish, Batrachians, Reptiles, Shells, and Marine Invertebrates sold by A. G. Reynolds, Gulfport, Fla.

WANTED.—No. Am. Cerambycidæ and Buprestidæ, especially *Agrilus;* will collect insects of any order in this locality for exchanges in above families. C. A. Frost, 26 Pond St., Framingham, Mass.

THE UNDERSIGNED will greatly appreciate receiving records of New Jersey species not listed in Smith's Insects of New Jersey. Harry B. Weiss, 242 Raritan Ave., New Brunswick, N. J.

FINE SPECIMENS of the large Mantis, *Paratenodera sinensis,* collected at Mt. Airy, Philadelphia, Pa., offered in exchange for North American Lepidoptera. Philip Laurent, 31 East Mt. Airy Ave., Philadelphia, Pa.

WANTED.—Cicadellidæ from North America, especially from southern and western States, for cash or in exchange. C. E. Olsen, Am. Museum Nat. Hist., New York City.

WANTED.—Papers published since 1894 and containing references to American Coleoptera, by Bernhauer, Grouvelle, Lesne, Leveille, Lewis, Pic, Otto Schwarz, Wasmann or other foreign authors. Will pay cash or give in exchange papers by American authors that I have in duplicate. C. W. Leng, No. 33 Murray St., New York City.

WANTED.—For cash or exchange, "Synopsis of the Erotylidæ," Crotch. Wm. Beutenmuller, 879 Whitlock Ave., Bronx, New York, N. Y.

LIST OF

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By CHARLES W. LENG

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Vol. XIV JUNE, 1919 No. 3

BULLETIN

OF THE

BROOKLYN ENTOMOLOGICAL SOCIETY

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Editor

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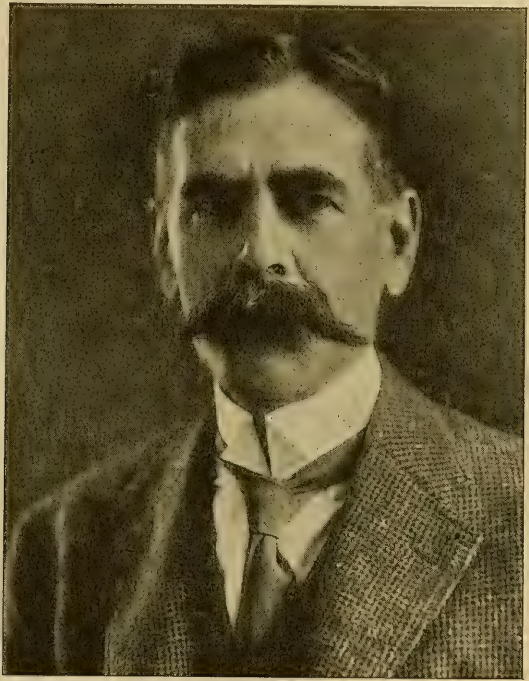

ROBERT PERCY DOW.

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A TRIBUTE TO OUR OLD EDITOR.

Resolved, That the Brooklyn Entomological Society hereby publicly and officially expresses its appreciation of and gratitude for the indefatigable and earnest labors of Mr. Robert P. Dow, its Corresponding Secretary and Editor and the guiding spirit of its revived Bulletin since 1912; and that this minute be entered on the records of the Society as an enduring testimony of its feelings toward one who has served it so faithfully and well.

(Passed at the meeting of the Society of April 10, 1919.)

KEY TO THE NEARCTIC SPECIES OF PIESMIDÆ (HETEROPTERA).

By W. L. McAtee, Washington, D. C.

Hitherto the family Piesmidæ has been supposed to be represented in North America by only a single species, *Piesma cinerea* Say. To the writer this has appeared an improbable state of affairs, especially in view of the fact that twelve or more palæarctic species are recognized. His desire to study the neartic representation of the family has been gratified chiefly because of much appreciated loans of material by the following hemipterists: E. D. Ball, H. G. Barber, Carl J. Drake, Edmund H. Gibson, J. R. Malloch, Herbert Osborn and, H. M. Parshley, to all of whom he returns sincere thanks.

As stated, but one species of *Piesma* has hitherto been recognized from the nearctic region; in this paper eight new species and two new varieties are described, and one previously described species, *Agrammodes costatus* Uhler, assigned here. The new species are all from southwestern states where careful collecting of the group should be done. The Piesmidæ are partial to plants of the family Chenopodiaceæ, which when systematically examined in this country, will yield an abundance of specimens of some of the new species herein described, and probably additional new species. In connection with the present study examples of most of the European species have been examined, and there seem to be no holarctic identities. It may be added that the palæarctic species average smaller than the nearctic.

The Piesmidæ when recognized as a family distinct from the Tingidæ has been based on characters most of which are not absolutely trenchant.

The opposed characters are stated in the subjoined parallel columns:

Piesmidæ.	Tingidæ.
Jugæ free and more or less produced at apex.	Jugæ scarcely produced.

Scutellum exposed.	Scutellum usually concealed.
Discoidal area of elytra divided by a longitudinal vein.	Discoidal area not divided.
Ocelli usually present in macropterous forms.	Ocelli absent.
Clavus distinct in macropterous forms.	Clavus usually lacking or united with corium.
Membrane distinct, coriaceous only at base in macropterous forms.	Membrane entirely coriaceous and reticulated.

Characters which exist only in macropterous individuals are not satisfactory for definition of a family which contains numerous species often or usually brachypterous. Thus the last three characters listed in the foregoing table, though often used, are inadequate. Of the first three characters two are not entirely unequivocal, leaving really functional but one of the six characters usually advanced for recognition of the Piesmidæ. The division of the discoidal area by a longitudinal vein, the cubital, is seen in both long- and short-winged Piesmidæ, but not at all in Tingidæ. This together with sole possession of the peculiar thoracic cavities described below render it expedient to continue recognition as a distinct family of this group so intermediate between Lygaeids and Tingids that it has in turn been united with each.

The family Piesmidæ includes so far as known only the single genus *Piesma*, genotype *Acanthia capitata* Wolff.

Synonymy of the genus is as follows:

Piesma Saint-Fargeau et Serville. Encyclopédie Méthodique, Histoire Naturelle, Tom. X, Part. 2 (1825), 1828, p. 653. (*Acanthia capitata* Wolff and *Tingis quadricornis* Dufour.)

Zosmenus Laporte, F. L. de. Essai d'une Classification Systématique de l'Ordre des Hémiptères (Hémiptères Hétéroptères, Latr.) Magasin Zoologique (Guérin), 1832, p. 49 (*Zosmenus maculatus* n. sp.). *Zosnanus* on p. 47.

Aspidotoma Curtis, John. Characters of some undescribed Genera and species indicated in the "Guide to an arrangement of British Insects." The Entomological Magazine, January, 1833, pp. 196–197. (Type *Acanthia capitata* Wolff.)

Zosmerus Burmeister, Hermann. Handbuch der Entomologie, Bd. II, Abth. 1, 1835, p. 262. (*Acanthia capitata* Wolff and *Zosmenus maculatus* Laporte.)

Agrammodes Uhler, P. R. in A Preliminary List of the Hemiptera of Colorado, by C. P. Gillette and Carl F. Baker, Bul. 31, Colo. Agr. Exp. Sta. (May, 1895), June 7, 1895, p. 56. (*Agrammodes costatus* n. sp.)

From examination of the type of *Agrammodes costatus* Uhler and numerous other specimens I have no doubt that the species is a brachypterous *Piesma*. It possesses all essential characters of the genus including the divided discoidal area and peculiar thoracic cavities described further on; Uhler himself mentions "the characteristic head of *Piesma*."

Uhler compares his species to *Agramma* and if we may judge from his selection of a generic name was much impressed by the similarities. Van Duzee places* Uhler's genus and species in the Serenthiini, the tribe of the Tingidæ to which *Agramma* = *Serenthia* belongs. However one of the principal characters of that tribe is that the lateral margins of the pronotum are never laminate-dilated. In the type specimen of *Agrammodes costatus* this margin is explanate, a fact indicated in Uhler's description by the expression "lateral margins a little reflexed."

The more important structural characters of the genus *Piesma* are the following: *Antenna:* first joint globular to ovoid; second ovoid, shorter than first; third cylindrical, slightly enlarged distally, usually the longest joint and at least as long as fourth; the latter clavate, finely pubescent. *Head,* with the jugæ produced as slender processes, projecting more or less beyond tylus, and more or less connivent before it; ocelli usually distinct in macropterous specimens; a double spine at the inner angle of each eye; beak extending slightly beyond fore coxæ, first joint alone, and second and third together, a little shorter than fourth.

Rostral sulcus deep on head, the bucculæ high, thin and incurved, deep also on forepart of prosternum, narrower and shallow between fore-coxæ, represented by two lines of pollinosity on mesosternum and by a broad and shallow depression of metasternum.

---

* Van Duzee, E. P. Catalogue of the Hemiptera of America North of Mexico, etc. Univ. of Calif. Publ. Tech. Bul., Vol. 2, Nov. 30, 1917, p. 223.

Thorax beneath, coarsely reticulated except for mesosternum which is finely granular and dark colored, even black, on each side of rostral sulcus. Thorax above, coarsely punctate, more or less narrowed anteriorly, humeral regions rather prominent, anterior lateral margins distinctly, though narrowly, explanate, usually sinuate and slightly reflexed; thorax with five more or less evident carinæ, the lateral pair sometimes being mere bullæ near anterior angles; the central group of three, of which the outer two are the strongest, are often conspicuous, and sometimes tortuous and more or less calloused; these carinæ become evanescent on posterior lobe of thorax, the small central one is sometimes obsolete, and all may be inconspicuous; the other two carinæ, referred to in a preceding sentence as the lateral pair, do not vary so much in development, though in a few cases they become prolonged posteriorly, forming veritable carinæ paralleling and resembling the central pair; these lateral carinæ are important however as they share in a character which appears to be the most remarkable of any possessed by this group, they being hollowed out beneath, housing a cavity, having a lunate opening on the underside of thorax just within the anterior portion of expanded thoracic margin, the inner side of which cavity is convex and smooth, the outer concave with the coarse reticulation of the upper surface of the thorax showing through; internally the inner wall of this cavity is the seat of attachment of a very large muscle mass. This peculiar cavity evidently is a fundamental character, as it has been found in all the species and in nymphs of all stages examined. It does not seem to be present in any of the genera of the Tingidæ, and of all the characters assigned would seem to afford the most firm ground for recognition of the family Piesmidæ.

Scutellum: large, granular, exposed near apex in a rounded, calloused tubercle.

Elytra, in macropterous specimens: coarsely punctate, excepting membrane; clavus distinct; elytra without discal area as in Tingids, this part of elytron being divided by the prominent cubital vein; distad of posterior extension of brachial vein, the membrane is bordered by a narrow reticulate area; membrane with four spur veins, only one of which, the third from apex, appears to be a direct continuation of one of the other elytral veins (the cubital).

Elytra, in brachypterous specimens, everywhere coarsely punctate, the claval suture obliterated and claval area solidly fused with remainder of elytron; the claval vein and upper part of brachial vein join, enclosing a distinct area additional to those observable in the macropterous elytron. Because of the absence of a membrane, the longitudinal veins are lengthened; furthermore all the veins are more prominent than in macropterous specimens. For descriptive purposes, names of the elytral areas have been needed and those adopted are indicated in one of the accompanying figures.

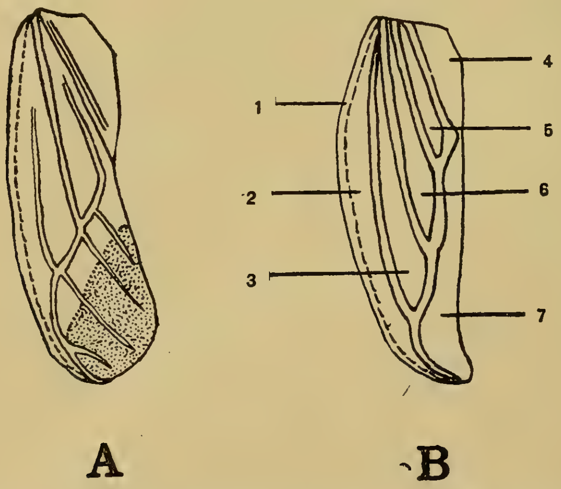

FIG. 1.—*A,* macropterous elytron of *Piesma,* membrane stippled; *B,* brachypterous elytron of *Piesma,* elytral areas are named as follows: 1, costal; 2, subcostal; 3, cubital; 4, claval; 5, interstitial; 6, brachial, and 7, sutural.

Venter: fifth abdominal segment narrowed in middle, fifth and sixth each terminating at their postero-lateral angles in rounded tubercles; male genital segment broadly rounded, a notch between it and posterior edge of sixth segment, another notch on edge of sixth segment just inside tubercle. In females the sixth segment is almost completely divided by a triangular notch for the reception of the genital segment, which is acute posteriorly; there are two triangular processes on each side between apex of genital segment and tubercle of sixth segment, the inner larger and belonging to the genital segment, the outer smaller, rounded, belonging to the sixth segment and scarcely extending caudad of tubercle.

KEY TO THE SPECIES.

A. Thorax more or less emarginate on each side.

B. Thorax distinctly narrower across anterior than across posterior angles (1/9 to 1/5 less).

C. Posterior lobe and humeral region of thorax rather swollen; dorsal carinæ inconspicuous; third antennal joint in proportion to fourth as 8 is to 7; reticulated area distad of posterior arm of brachial vein (and bordering membrane), with a distinctly scalloped margin, decurrent farthest along third membranal vein (extension of cubitus) .... *patruela* n. sp.

CC. Posterior lobe of thorax not unusually elevated; dorsal carinæ distinct; third antennal joint long both absolutely, and relative to fourth joint, proportions 8–10:6–7; reticulated area distad of posterior arm of brachial vein of nearly uniform width where traversed by second to fourth membranal veins, the edge nearly straight........ *cinerea* Say.

BB. Thorax nearly as wide across anterior as across posterior angles (1/15 to 1/12 less); third joint of antenna short, both absolutely, and relative to fourth joint, proportions 6–7:5–6.

D. Dorsal carinæ of thorax very distinct, elevated, more or less tortuous; an intercalated carina behind each callosity being more or less evident.

E. Brachial area distinctly larger than cubital, the latter with not more than three series of punctures, *brachialis* n. sp.

EE. Brachial area not larger than cubital, the latter with four or more series of punctures.

F. More closely punctured, number of punctures along inner apical border of cubital area 7–8, *ceramica* n. sp.

FF. Less closely punctured, number of punctures along inner apical border of cubital area 5, *rugulosa* n. sp.

DD. Dorsal carinæ less distinct, not at all tortuous, sometimes nearly obsolete.

G. Maximum number of series of punctures in subcostal area 3.

H. Clavus or claval area with about 4 series of punctures; color uniform fuscous.......*protea* n. sp.

HH. Clavus or claval area with about 3 series of punctures; typical color stramineous with conspicuously darkened veins ....*costata* Uhler.

GG. Maximum number of series of punctures in subcostal area 4–5.

I. Form more depressed, subcostal area less deflexed; color brown.....................*depressa* n. sp.

II. Form thicker, subcostal area very convex and deflexed; front margin of pronotum nearly or quite angularly emarginate; color pale....*incisa* n. sp.

AA. Thorax without lateral emarginations; paranota unusually broad, with two full series and some intercalated areoles......*explanata* n. sp.

Piesma patruela, n. sp.

A species recognizable by the swollen posterior lobe, prominent humeral region and narrowed front of thorax, together with the reticulated area between posterior extension of brachial vein and membrane being distinctly scalloped in outline and decurrent farthest on extension of cubital vein. The carinæ of the thorax are merely low rounded swellings and the posterior prolongations of the paranota are evanescent before reaching humeral angles. Areolar formula, see table, page 92. Length 2.25 mm.

The ground color is pale ivory, with the callosities, and head except processes, black; scutellum, streaks on thorax, and spots on all parts of elytron except base of corium and membrane, dark brown; under surface chiefly dark brown. In color and form of thorax this insect suggests *Leptoypha mutica* Say.

Type, a male, labelled Arizona, Morrison, 1882 (U. S. N. M.). Paratype, a male, from Cotulla, Texas, April 15, 1906, F. C. Pratt (U. S. N. M.).

Piesma cinerea Say.

T. [*ingis*] *cinerea* Say, Thomas. Descriptions of new species of Heteropterous Hemiptera of North America, 1832, p. 26; The Complete Writings of Thomas Say on the Entomology of North America, 1, 1859, p. 349. [United States.]

The more valuable recognition characters of this species are: Thorax distinctly narrower in front than behind, thoracic carinæ strong, usually slightly tortuous and calloused, the smaller median carnia usually evident; third antennal joint long, distinctly longer than fourth; reticulated area between posterior extension of brachial vein and membrane, of nearly uniform width where transversed by second and fourth membranal veins, the edge usually almost straight. Areolar formula; see table, page 92. Length 2.75–3.25 mm.

Apparently *P. cinerea* remains a transcontinental species. This is not to say that there is not a considerable degree of variation, but that it is not distinctly correlated with geographic distribution or is otherwise unavailable for taxonomic purposes. A few specimens examined had the paranota almost bisinuate and somewhat reflexed, but I am convinced this is mere individual variation. There are faint indications that a western subspecies is forming; specimens from California in particular seem to average larger, paler in color and have the third antennal joint slightly shorter. These differences are not marked however and I am not inclined to recognize them by naming the variants.

The coloration is variable, the usual pattern being a pale stramineous ground bearing mostly irregular brownish blotches, largest and sometimes solidly occupying considerable areas on posterior lobe of thorax. On costal margin 6–7 spots tend to have a more regular oblong form. On the anterior lobe of the thorax outside of carinæ and just anterior to transverse impression are two approximately round brown patches covering the callosites. The ground color varies to dead white and rubescent and the markings from light-brown to black.

The color varieties grade into each other to such an extent that it is probably not worth while to name all of them. I have separated under vernacular name only, pale, spotted and dark varieties. One other variety which is distinct and always separable, I name *Piesma cinerea* var. *inornata* new variety. It varies from pale stramineous to greenish in color, and is entirely without dark markings, even the callosities being pale. Type, a male, from Lindsay, California, August 29, 1911, on tumbleweed, J. R. Horton (U. S. N. M.).

On the basis of specimens examined *P. cinerea* as a whole ranges from Washington State, Ontario and Massachusetts south to California, Texas, Florida, and to Linares and Tampico, Mexico. Variety *inornata* apparently may occur anywhere in the general range.

Piesma brachialis, n. sp.

Thorax nearly as wide in front as behind; carinæ distinct and tortuous; third antennal joint but little longer than fourth; brachial area distinctly larger than cubital.

Structural details as noted in key; ground color pale stramineous, reticulation more brownish, with last joint of antenna (except at base), tip of clavus, tip of beak, and mesosternum except along middle, blackish brown; corium near humeral angle pale and slightly calloused; eyes reddish. Thoracic carinæ distinct, the outer ones of the central group abruptly convergent near front margin of thorax, slightly divergent posteriorly. Brachial area of elytron larger than cubital the latter with a maximum of three series of punctures. Areolar formula, see table, page 92. Length 2.75 mm.

Type of male from Tucson, Ariz., December 20, H. G. Hubbard (U. S. N. M.). The type and the paratype described below were found on *Isocoma* (*Bigelovia*) *hartwegi,* according to a letter from Mr. Hubbard, kindly extracted for me by Mr. E. A. Schwarz. On account of the specimens being collected at the same time, on the same plant, and particularly because they agree in having the brachial area distinctly larger than the cubital, I have no doubt that the macropterous type and brachypterous paratype belong to the same species. The paratype is a broadly oval brachypterous form, more than half as broad as long; reticulation coarse, claval area with only three rows of punctures, brachial area decidedly larger than cubital, the latter with a maximum of three rows of punctures. A few faint brown flecks on costa; eyes, terminal antennal joints, and tip of beak dark reddish brown. Length 2.5 mm.

Another paratype, also a brachypterous female from Richfield, Utah, August 24 (Ball), is a little more robust, and has tips of the clavi, about six maculæ on either costa, and scattered dots on the principal veins and on thorax, black.

Piesma ceramica, n. sp.

Thorax and antenna as indicated in key; thoracic carinæ very distinct, more or less tortuous, the pair of lateral carinæ especially being longer and more conspicuous than in preceding forms; a pair of intercalated short carinæ just back of callosities.

A brachypterous species, pale stramineous in color, with only traces of light brown spots along costal margins and on callosities, eyes reddish. Elytra slightly surpassing abdomen, the divisions solidly fused, sometimes slightly incurved and overlapping at tip, sometimes not. Whole dorsal surface closely punctate; the distinct sculpturing and pale color suggest a wax counterfeit fresh from the mould, rather than a real insect. Areolar formula, see table, page —. Length 3 mm.

Described from three females, labelled Courthouse, U., 8–10–06 (U. S. N. M.).

Piesma rugulosa, n. sp.

A species much like the above in structure of antennæ and thorax including the carinæ, but smaller, less closely punctured, and spotted.

Elytra distinctly brown spotted; about nine spots on each costal margin, scattered spots on corium and claval area of the fused elytron, and a few indistinct spots on posterior part of thorax; venter with five series of brown spots; eyes pale. Areolar formula, see table, page 92. Length 2.5 mm.

Type a brachypterous male, from Rocky Ford, Colo., April 18, 1911, on greasewood, H. O. Marsh (U. S. N. M.).

Piesma protea, n. sp.

Structure of antenna and thorax as noted in key; carinæ much reduced, the median pair only being obvious, lateral almost obsolete, central and intercalated lacking.

Color pale stramineous to pale fuscous, the membranous portions of integument whitish hyaline, jugæ and other processes of head (except sometimes chiefly fuscous basal and terminal joints of antennæ) concolorous or ivory color. Venter with two median series of large and two lateral series of small pale yellow spots; or entirely pale. Areolar formula, see table, page 92. Length 2.25–2.5 mm.

Type, a macropterous male, from Hot Springs, Arizona, June 21, H. S. Barber (U. S. N. M.).

Paratypes, a brachypterous male, labelled Arizona, Morrison, 1882 (U. S. N. M.), and one brachypterous and one macropterous male from Lincoln, Nebraska. July. (Drake.)

Piesma costata Uhler.

Agrammodes costatus Uhler, P. R. new genus and species in A Preliminary list of the Hemiptera of Colorado, by C. P. Gillette and C. F. Baker, Bul. 31, Colo. Agr. Exp. Sta. (May, 1895), June 7, 1895, pp. 56–7 [Estes Park, Colo.].

Reasons for synonymizing the genus *Agrammodes* with *Piesma* have been discussed in the introduction.

The species *costata* is characterized by the structural details pointed out in the key, and especially by the thoracic carinæ being obsolete and the veins of the elytra very prominent and dark.

Ground color pale stramineous or whitish, least obscured on anterior lobe and margins of thorax and base of corium, the latter always occupied by a pale spot. Reticulation of most of upper surface of varying shades of fuscous, the principal veins of elytra infuscate, elevated and conspicuous. Callosities, scutellum, humeral angles and head except processes fuscous to blackish, processes of head and antennæ except apical half of terminal joint, honey yellow. The jugæ vary greatly in length; in females they are sometimes no longer than tylus, in males they sometimes reach to middle of second antennal joint. Areolar formula, see table, page 92. Length 2–2.25 mm.

Specimens examined:

A specimen from collection of E. D. Ball, labelled Colo. No. 1133, is marked type. The full data for the type as given by

Gillette and Baker is Estes Park, Colo., July 12, Gillette; Fort Collins, Colo., June 1, 16; July 1, 28, 1898 (Drake, Barber, McAtee); N. Colo., 5.9.98 (Ball); Arizona (U. S. N. M.).

A specimen from Fort Collins, Colo., July 1, 1898 (Drake), with whole body except eyes, terminal antennal joint and tip of beak stramineous, is made the type of *Piesma costata* variety *defecta* new variety.

Piesma depressa, n. sp.

Structure of antenna and thorax as indicated in key: carinæ, except intercalary traceable, but low, front of thorax almost angularly emarginate; whole dorsal surface closely punctate, sutural area with a maximum of six rows of punctures.

Ground color stramineous, but reticulation almost uniformly infuscate a little lighter at base of corium and on pronotal carinæ; apex of scutellum pale. A finely reticulated, very plainly colored species; eyes reddish. Maculations of under surface obscure. Areolar formula, see table, page 92. Length 2.25 mm.

Described from a single female specimen, labelled Ariz., 2073 (U. S. N. M.).

Piesma incisa, n. sp.

Structure of antenna and thorax as pointed out in key; front of thorax almost or quite angularly emarginate; dorsal surface less closely punctate than in *P. depressa,* sutural area with a maximum of four series of punctures.

Color pale stramineous, all of basal, and apical half of terminal antennal joint, tips of jugæ, and sometimes other parts of head, and femora, infuscate; eyes reddish. A closely reticulated, very pale form. Areolar formula, see table, page 92. Length 2.25 mm.

Type, a macropterous female, labelled Ariz. 2073 (U. S. N. M.).

Paratypes, brachypterous females, labelled Ariz. (Drake), and Dixie, Utah, September 9, 1915, E. D. Ball (Ball).

Piesma explanata, n. sp.

In size, color and character of pronotal carinæ, this species is much like *P. cinerea* Say, but is strongly distinguished from that and all the other species here treated, by the much broader, scarcely reflexed or sinuate paranota, in which there are two full series and some intercalated areoles. The color is stramineous, varying to reddish brown over the more opaque parts of the body; tip of clavus dark; faint fuscous maculations on paranota along costa and more sparingly elsewhere; scutellum yellowish; eyes reddish. Under surface reddish stramineous, save mesosternum which with the exception of the rostral sulcus is black; apex of beak also black. Areolar formula, see table this page. Length 3 mm.

Type a macropterous female from Mouth of Bear River, Utah, September 30, 1914, Alex. Wetmore (U. S. N. M.).

Areolar Formulæ.

As a check upon identifications, a table is subjoined showing the maximum number of series of punctures or areoles in the various elytral divisions. The maximum number of series can be counted in the various areas at about the following locations; for the subcostal area, a little anterior of middle; cubital, along a posteriorly directed oblique line from inner angle; brachial, on a line from apex of slavus through inner angle of the area; claval, opposite apex of scutellum; and sutural, an oblique series usually beginning at juncture of subcostal and cubital areas. The costal area has uniformly a single series of areoles in all species; the

Table of Areolar Formulæ

Name of Species.	Area of Elytron.							Length of Wing.
	Costal.	Sub-costal.	Cubital.	Brachial.	Inter-stitial.	Claval.	Sutural.	
brachialis	1	3	4	4	2	4	2	macropterous.
	1	3	3	4	3	3	4	brachypterous.
ceramica	1	3–4	5–6	4–5	2–3	4–5	4–5	brachypterous.
rugulosa	1	3	4	4	2	4	4	brachypterous.
protea	1	4	4–5	4	2	4–5	3	macropterous.
	1	3	4	4	2	4	4	brachypterous.
costata	1	3–4	4–5	4–5	2–3	3–4	4–5	brachypterous.
depressa	1	4	5	5	2	5	6	brachypterous.
incisa	1	5	5	4	2	5	3	macropterous.
	1	5	5	5	2	5	4	brachypterous.
explanata	1	5	6	4	2	5	4	macropterous.
cinerea	1	3–5	4–5	3–5	2	4–5	2–3	macropterous.
patruela	1	3	4	4	2	4	4	macropterous.

interstitial area varies in areolar count only in brachypterous specimens; the analogue of this area in macropterous specimens, has invariably a single row of areoles on each side of the claval suture; the count of areoles for the sutural area of macropterous specimens refers to the series of areoles in reticulated area between posterior extension of brachial vein and membrane.

REMARKS ON THE ORIGIN AND SIGNIFICANCE OF METAMORPHOSIS AMONG INSECTS,

By G. C. Crampton, Ph.D.

(Continued from p. 40.)

In several publications (notably in his book "Die fossilen Insekten"), Handlirsch has developed the idea that cold is the initiating factor in the production of holometabolism. One of the reason he proposes for so thinking is that under present climatic conditions, insects with incomplete metamorphosis flourish in mild, frost-free and tropical regions; while he seeks to give the impression that insects with complete metamorphosis occur largely in cold climates. Orthoptera, Phasmidæ, Mantidæ and Embiidæ are wholly absent from the arctic regions, while a large number of Lepidoptera, Diptera and Hymenoptera, etc., occur in the cold climates. Of such insects with incomplete metamorphosis as occur in climates with cold winters, most are not peculiar to those climates, but occur in warm climates as well, and have gradually adapted themselves to the colder climates as migrants from the warmer zones. On the other hand, many species of holometabolous insects are peculiar to the colder climates in which they occur. He points out that of all known species of Dermaptera, only about 4 per cent. occur in temperate regions with well marked winters, 2 per cent. of the Blattidæ, and a much smaller percentage of the Mantidæ, Phasmidæ, etc. On the other hand, about 30 per cent. of the species of Coleoptera, 40 per cent. of the Hymenoptera and 50 per cent. of the Diptera occur in temperate regions. In the Carboniferous

Period, a mild uniform climate prevailed almost to the pole, in all probability without frost or dry seasons, and the insects of this period are predominantly those with incomplete metamorphosis. At the beginning of the Mesozoic Period, the climate became changed and, according to Handlirsch, caused the appearance of holometabolism, since several holometabolous groups such as the Coleoptera, Neuroptera, Mecoptera, etc., make their appearance at this time. Handlirsch would claim that the appearance of cold, through the influence of the seasons, shortens the feeding and growth period, and allows insufficient time for insects to develop gradually, thereby bringing about the insertion of a resting stage during which wings and many other parts of the body rapidly develop. He also considers that the ancestors of winged insects were aquatic.

If Handlirsch had not attempted to so present his figures as to give the wrong impression—in other words, if instead of saying that 30 per cent. of the Coleoptera, 40 per cent. of the Hymenoptera and 50 per cent. of the Diptera occur in temperate climates, he had set forth the figures in their true light, namely that 70 per cent. of the Coleoptera, 60 per cent. of the Hymenoptera and 50 per cent. of the Diptera occur in *warm* climates—these figures if they have any meaning at all, would clearly indicate that holometabolism *originated in warm climates* where most of the holometabolous forms occur! The Coleoptera are the most primitive of the holometabolous forms mentioned, and most of them occur in the warm climatic conditions where they originated, as one would expect to be the case. The Hymenoptera are slightly more highly developed than the Coleoptera, and being somewhat more adaptable forms, have been able to establish themselves in somewhat greater numbers than the Coleoptera, in the temperate regions. On the other had, the Diptera are the highest of the metabolous insects mentioned—in other words, the latest comers to arrive upon the scene—and are also very numerous in species, apparently highly adaptable, and possibly are in a more "active state of evolution" (*i. e.*, producing more features to be acted upon by natural selection). The Diptera have therefore been even better able to establish themselves in the "inimical" regions of cold than the more primitve members of the holometabolous group, as would be expected if holometabolism originated in the warmer climates and enabled its possessors to penetrate and establish themselves in a region of rigorous climate; so that instead of showing that holometabolism originated in a rigorous climate and that it was caused by cold, Handlirsch's figures would show that holometabolism probably originated in the warm climatic conditions in which insects were developed, and enabled those forms in which it occurred, to penetrate the regions of more rigorous climate.

If metabolism were brought about by the insertion of a pupal stage due to the influence of cold, we would expect that in temperate climates most holometabolous insects would spend the winter in the pupal stage, whereas, on the contrary, most of them pass the winter as larvæ and adults (or even in the egg stage).* The pupal stage is a helpless one, and if there were a tendency on the part of some holometabolous insects to enter the pupal condition at about the time of the onset of cold weather, when parasites and other enemies were not active, this feature might confer some degree of protection upon the insects in which the tendency occurred, and thereby tend to preserve this trait; although other forms having developed other means of protecting the helpless pupæ, might pass the winter in other stages of development. It must be borne in mind, however, that the insertion of a pupal stage in the life history of insects is not the chief feature in the development of holometabolism; but the production of a *larval form* differing greatly from the adult was doubtless the important feature leading to the development of complete metamorphosis. The quiescent pupal stage is not so much the result of the influence of cold, as the result of profound internal changes through which the very different adult form is assumed. There is a profound change in the chemical nature of the blood (the blood of a larva about to pupate, if injected into a young caterpillar will paralyze the latter), a breaking down of certain larval tissues, etc., and the building up of adult structures, during the pupal stages, so that there is small wonder that most pupæ are unable to lead an active existence while these conditions last; and I cannot believe that the presence or absence of cold would have any effect upon the *origin* of such a phenomenon.

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* I think that the cause of the insertion of a pupal stage can be better explained thus. When the immature stages of an insect are essentially like the adults (as in lower insects), there is no necessity for the insertion of a pupal stage, to assume the adult form; but when the immature stages and adults have gradually come to differ so greatly from each other (as each develops along its own line of specialization) that a great change must be undergone by the immature form in assuming the adult condition, this necessitates the insertion of a pupal stage, or "making over" period. It has been suggested that the gradual changes taking place through several moults in the individual development of the lower insects, have, so to speak, been concentrated in the pupal stage of insects with complete metamorphosis; but I do not think that this is an adequate explanation for the origin of a pupal stage, even if it were found to be the case that the lower insects moult more frequently than the higher forms do.

Adaptation to aquatic life during the immature stages of development, is another feature which has enabled some very primitive insects to establish themselves in temperate climates (and in the case of such insects as *Grylloblatta,* protected existence under stones has served the same purpose) ; but there is no real evidence for considering that the first winged insects were aquatic in their immature stages. The different location of the gills and the different means of adapting themselves to aquatic life even in the lower forms would clearly indicate that this feature is a comparatively recently acquired adaptation, produced more or less independently in different groups of insects; and the development of the tracheal system in the embryonic stages, very evidently points to the fact that aërial respiration was the most primitive one in insects as a whole, while aquatic respiration has been more recently acquired. The structures which Handlirsch considers as organs serving the purpose of gills in Palæodictyoptera (which were among the first winged insects to be evolved) are clearly nothing but paranota, which occur in a great number of primitive land-inhabiting insects living today (*e. g.,* in the *Ancistrogaster*-like Dermaptera, in lampyrid larvæ and various other forms described in the Jour. N. Y. Ent. Soc., Vol. 24, p. 1) and are not gills at all, so that all of the available evidence points to a terrestrial life on the part of the first winged insects, during their immature stages, and many of them probably exhibited a hiding tendency—a trait which, in conjunction with the development of suitable body-conditions, may have eventually enabled certain of them to adapt themselves to life in different media, and may have had considerable influence in their ability to penetrate, and establish themselves in, regions of cold and other unfavorable conditions.

Whether metamorphosis is of a polyphyletic origin (as Handlirsch and other recent investigators are inclined to believe) or not, is a question of some importance in determining the value of metamorphosis as an index of relationships. Personally, I consider that the presence or absence of metamorphosis is of secondary importance, since I believe that it may have arisen independently in some groups of insects; but there is some evidence for believing that its occurrence is of value in determining relationships in some cases, since in the neuropteroid superorder (Neuroptera, Mecoptera, Hymenoptera, Diptera, Trichoptera, Lepidoptera, etc.) all of its members exhibit a complete metamorphosis, and comparative anatomy clearly shows that these insects are descended from a common stem. On the other hand, comparative anatomy would indicate that the holometabolous Coleoptera are more closely related to the Dermaptera and other "non-metabolous" forms, than they are to the holometabolous neuropteroid insects mentioned above, and the Coleoptera should therefore be grouped in the plecopteroid superorder (Plecoptera, Embiidæ, Dermaptera, Coleoptera, etc.) rather than in the neuropteroid superorder, although the plecopteroid group probably contains the forms resembling the ancestors of the neuropteroid group as closely as any.

As one of the reasons for considering that metamorphosis, or lack thereof, is not an important index of relationships among insects, the fact that a complete metamorphosis may occur in males of some Coccidæ and not in females of the same species was mentioned. Certain investigators, among whom may be cited Berlese, 1913 (Redia, Vol. 9, p. 134), would interpret the character of the females in such cases as the result of an arrested development in body-form, while the ovaries have continued to develop to functional activity. This state of affairs is in a measure comparable to a "neoteinic" condition of sexual maturity in a "larval" body, such as occurs in certain termites, etc., or even to the pædogenesis of certain Diptera. While such an explanation may be quite valid, it does not alter the fact that in some Homoptera (male Coccidæ) a complete metamorphosis may occur, while in other Homoptera (in which the females assume the adult form as well as the males) such a complete metamorphosis does not exist—so that in such cases, at any rate, complete metamorphosis may or may not occur within the same order of insects, and is therefore not always to be taken as a criterion for determining the interrelationship between orders, since it does not hold good even within the same order of insects.

The older entomologist, particularly the English school of investigators who followed Ray, Leach and others, laid great stress upon the type of metamorphosis exhibited by insects, in grouping the orders together; while the earlier French entomologists, being influenced by Cuvier and other antomists, gave greater weight to comparative morphology in grouping the orders together. Later investigators attempted to combine the two systems; but with the exception of the German embryologists such as Korschelt and Heider, Heymons and others, the tendency among recent investigators has been to place great weight upon the comparative anatomy of the adult insects, since the adults represent the important stages in the evolutionary process, to which are intrusted the propagation of the race and the continuance of the species, and represent the perfected types toward which evolution is evidently tending. The larval stages, on the other hand, are regarded by some recent investigators, largely as later-developed "interpolated" adaptive stages, frequently provided with provisorial structure, etc., having no particular phylogenetic significance; and indications of interrelationships offered by larval or immature forms are frequently ignored in recent works, largely through the fact that systematists have centered their attention upon the adult stages, which usually offer easier-used identification characters, are more readily handled, and which are easier to collect and preserve. I think, however, that larvæ (and immature forms) when compared together may offer some very valuable clues to the interrelationships of the insectan orders, and while the comparative morphology of adult forms offers one of the most reliable means of determining such interrelationships, its evidence must be tested by that from other sources such as embryology, palæontology, the study of habits, etc., in addition to the study of the anatomy of larvæ, since it is only by obtaining the evidence from all possible sources, that we can arrive at the correct determination of the development and interrelationships of the different lines of descent among insects.

It is not beyond the realm of possibility that in the polymorphism of such lower insects as the Isoptera, we have the beginnings of a more pronounced metamorphosis in higher forms, since the tendency toward the production of different forms, instead of being scattered among different individuals (castes) in a species, might, so to speak, be gathered in the different stages of one individual. In the case of the South African butterfly *Papilio merope,* which has a male of one type, and females of other types differing among themselves very markedly in color and markings, there is one type of female which mimics a protected Acræid which is brown and yellow, while another type of female mimics a protected Acræid which is black and white. Both types of females may occur in the same brood, possibly as mutants; but natural selection would tend to preserve the appropriately colored and marked type of female in that region in which its particular model is the predominant form. In a somewhat analogous fashion, there may eventually have arisen among primitive insects in which there was already present a tendency to assume a slightly different "larval" condition (*e. g.,* as occurs among Odonata, Plecoptera, etc.) certain new types which differed quite markedly from the adults in their immature stages—these new types possibly arising as mutants. At any rate, these changes probably arose from within rather than owing their origin to wholly external influences although it is impossible to determine in some cases, how much the environment may have influenced the germ plasm itself.

As long as insects in their immature stages are so to speak small replicas of the adults, they are no better fitted than the adults themselves for invading and establishing themselves in new media (woody tissue, etc.) or in new regions where existence is precarious. Similarly, unless suitable instincts were developed in conjunction with the proper bodily structures, such forms would not be able to take advantage of the developing physical ability to invade the new media and regions. It was only when these necessary "prerequisites" were acquired, that the forms better equipped than their more conservative "non-metabolous" relatives, were enabled to invade and adapt themselves to new surroundings, which their more conservative relatives were not fitted to do. It is extremely difficult to comprehend how insects not already equipped for invading new surroundings could successfully enter these surroundings and establish themselves there, so it would appear that the environment did not produce metamorphosis, but the insects which developed metamorphosis in the old environment were able to leave the old conditions and establish themselves in new ones. Furthermore, since new habits and structures are frequently developed by more or less gradual changes in previously existing ones, the structures and traits developed in connection with the hiding habit, may have furnished a "point of departure" in the development of the ability to enter upon a wood-boring, and other new types of existence;* and the differences between the immature and adult stages already quite marked in lower insects (Odonata, Plecoptera, etc.) may have become more and more accentuated, and the more "plastic" immature stages probably developed more and more adaptive features to be acted upon by natural selection, until complete metamorphosis was evolved, not so much by the direct action, as by the selective influence, of the environment.

While it is quite true that larvæ as well as adults have become

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*It involves no great feat of imagination to assume that through an intensifying of the tendency to hide under stones, logs, loose bark, etc., among certain insects, there might eventually develop a tendency to burrow or eat their way under loose bark, or into soft wood, among such forms; and the wood-boring habit possibly arose in this way. Similarly, the habit of hiding under stones, etc., might lead to a tendency to dig under such shelters, and eventually to a tendency to tunnel in the earth. Furthermore, the fact that certain Tipulidæ burrow in the soil, while others burrow in moist earth near the water, and still others live in muck and water, suggests that these instances may represent possible steps in the adaptation to aquatic life on the part of certain water-inhabiting forms, although other features, such as adaptations to life in an intensely humid atmosphere, etc., were doubtless factors in the development of the ability to live in water.

modified in adaptation to their own environmental conditions, we must not lose sight of the fact that larvæ may not exhibit later-developed, interpolated conditions in all their features of habit and structure, since in some respects the larvæ may be much more primitive than the adults, and present some characters of considerable phylogenetic importance. Thus the head and mouth parts of some larval Lepidoptera are much more primitive than those of the adults, the thoracic sclerites of larval Neuroptera may be much more like those of the Apterygota than the sclerites of the adults are, the long segmented cerci of the larvæ of certain carabid Coleoptera are much more primitive than the corresponding parts of the adult, and many similar features could be cited in this connection. In the lower forms, such as the Ephemerida, the mouthparts are frequently more like those of the Apterygota or Crustacea than the mouthparts of the adult are, and in the Plecoptera, I find that the head, thoracic sclerites and other parts, are more like those of the ancestral apterygotan type found in the Lepismidæ, than is true of the adult structures. This brings up the question as to whether the primitive types of larvæ, with their membranous body wall, with their more primitive type of sclerites, head, mouthparts, legs, and abdominal structures, etc., may not in some instances represent the ancestral condition more nearly than the adults do. In some cases, I am inclined to think that this is true, although in other cases, it is very evident that the larvæ have become far more specialized than the adults, and have added many interpolated conditions in adaptation to their own peculiar environmental conditions. These features as well as those discussed above, must be taken into consideration in attempting to account for the origin of complete metamorphosis among insects, and I think that there are too many factors involved in its development, to attempt to offer any one explanation for the origin of holometabolism—which may have developed more or less independently in several groups of insects.

PAPILIO CRESPHONTES, VAR. MAXWELLI FRANCK.

The type of this species is a male in the Barnes collection; the type locality, St. Petersburg, Fla. GEO. FRANCK.

NOTE ON THE SEXES OF THE TINGID MELANORHOPALA CLAVATA STAL (HEMIPTERA).

By H. M. Parshley, Smith College, Northampton, Mass.

I have recently had occasion to examine the extensive series of Tingidæ in the collection belonging to my friend Mr. J. R. de la Torre Bueno, and in going over the specimens of *Melanorhopala clavata* Stål I note that this species is peculiar in exhibiting sexual dimorphism to a degree unusual in the family. The males are smaller than the females and decidedly narrower in form, but the most striking difference is in the form of the antennæ, which, in the males, are only slightly clavate, the fourth segment being but little thicker than the cylindrical portion of the third and the latter only a little, though distinctly, enlarged at apex. Renewed study of extensive materials, including a beautiful series of specimens collected at one time and place and kindly sent to me for study by Mr. Wm. J. Gerhard, makes it evident that the form which I described as *M. obscura*[1] is in fact the male of *clavata*, described above. Having very few males at the time of description, I did not suspect that *M. clavata* would exhibit sexual dimorphism in the structure of the antennæ, a phenomenon which, as far as I know, is not to be met with elsewhere in the Tingidæ.

Osborn and Drake have questioned the validity of *M. obscura*,[2] regarding it as possibly identical with *M. lurida* Stål, and Gerhard (*in litt.*), relying on his experience as a collector, has expressed to me his doubts regarding the value of the antennal characters employed in separating these supposed species of *Melanorhopala*, but hitherto the sexual relationship of the forms in question has not been made known. I would bring to the attention of those having appropriate materials the further suggestion that *M. lurida* Stål may be in reality this same male of *M. clavata*, although the dimensions originally given[3] might be taken to indicate otherwise. It is worthy of note that most of the published references to *M. clavata*, including the original description[4] and Osborn and

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[*] On Some Tingidæ from N. E., Psyche, Vol. 23, 1916, p. 167.

[†] Notes on Tingidæ, Psyche, Vol. 24, 1917, p. 161.

Drake's figures,[5] have to do with the female sex exclusively. In accordance with the data presented above, the following synonymy is proposed:

Melanorhopala clavata Stål, ♂.
M. obscura Parsh.
?*M. lurida* Stål.

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[*] Enum. Hem., 3, 1873, p. 131.

[†] Enum. Hem., 3, 1873, p. 130.

[‡] Op. cit., Pl. 10, Figs. a, b, and c.

CATOCALA TRISTIS AND GRACILIS ON HIGH-BUSH BLUEBERRY.

By Chas. Rummel, Newark, N. J.

On a collecting trip to the Orange Mountains, N. J., May 25, 1918, while beating for caterpillars on the high-bush blueberry (*Vaccinium corymbosum*) a *Catocala* larva dropped into the umbrella. Recognizing it as one of the small species of the genus and suspecting that it might prove to be *tristis,* I continued beating the same kind of shrubs and secured two more larvæ. A strip of woodland south of the trolley line from Roselle to Cranford, N. J., where I had taken two adults of *C. tristis* in a previous season, on June 2, 1918, was found too wet and swampy for collecting. Next, on June 4, visiting the top of the Orange Mountains by way of the Bloomfield car line I secured two more larvæ by again beating on high-bush blueberry, one along the western slope near the top and the other in the wooded valley west of the mountains.

The first lot of three larvæ taken on May 25 pupated on June 4 and on June 28 a fine specimen of *C. tristis* emerged. Of the remaining pupæ one was parasitized, the other died. From the second lot of two larvæ, collected June 4, which pupated on June 10, a perfect specimen of *C. gracilis* hatched on June 28 and another on June 30.

This establishes high-bush blueberry (*Vaccinium corymbosum*) as a food plant for *C. tristis* and *C. gracilis.*

NEW NEARCTIC SPECIES OF THE GENUS ERIOPTERA MEIGEN (TIPULIDÆ, DIPTERA).

By Charles P. Alexander, Urbana, Ills.

During the past few years, several new species of the genus *Erioptera* Meigen have come to hand. Some of these have been characterized in other papers, but a few still remain undescribed. Most of these belong to the group of *E. chlorophylla* O. S., a small assemblage of species whose limits of distribution are still not well understood. I am greatly indebted to Mr. Nathan Banks for data on the types of *E. chlorophylla*, in the collection of the Museum of Comparative Zoölogy, and to Mr. Johnson and Mr. McAtee for specimens of the *chlorophylla* group. Unless stated otherwise the types of the new species are contained in the author's collection.

Erioptera margarita new species.

Male.—Length, 3.8–4 mm.; wing, 5.3–5.6 mm.

Female.—Length, 4 mm.; wing, 4.8 mm.

Antennæ with the basal segments light yellow, the flagellum brown; flagellar segments cylindrical, rather elongate, with coarse verticils. Head yellowish.

Mesonotum reddish brown, the lateral margins and the humeral region yellow. Wings pale yellowish, the costal region more suffused; stigma indistinct, pale brown; veins brown. Venation almost as in *E. microcellula* Alex., cell first M_2 closed, very small; second anal vein straight, diverging from the first anal vein; basal deflection of Cu_1 immediately before the fork of M.

Male hypopygium with the pleurites short and stout, the dorsal angle produced caudad into a pale fleshy lobe that is sparsely provided with coarse setæ. Pleural appendages two in number, the large one complex, bifid, the outer arm produced into a long, slightly curved, chitinized point whose surface is covered with very minute appressed teeth; the inner arm a broad, flattened chitinized blade with the apex truncated, in its angle at the base with a single conspicuous blackened conical point; the smaller pleural appendage is a slender arm whose acute chitinized apex is curved slightly caudad. The gonaphyses consist of six blackened chitinized hooks, a lateral pair that are very widely separated, the tips chitinized and covered with microscopic teeth. The four intermediate hooks consist of a pair of median slender, acutely pointed rods that are smooth, almost straight, with the tips contiguous or slightly decussate. Besides the above there is a transverse flattened plate whose lateral angles are produced into stout, curved chitinized hooks that are directed proximad; the posterior median portion of this plate is still further produced into a small, flattened bifid blade.

The female is similar to the male but the abdominal tergites are darker; the ovipositor is very long, especially the tergal valves which are slightly upcurved at their tips.

Habitat.—Colorado.

Holotype, ♂, Platte Cañon, altitude 10,000 feet, August 29, 1915 (E. J. Oslar).

Allotopotype, ♀.

Paratopotype, ♂, August 21, 1915; *paratypes,* 2 ♂'s, Colorado Springs, June 8, 1915 (M. C. Van Duzee).

A paratype is in the collection of Mr. Van Duzee.

Erioptera margarita is close to *E. microcellula* Alex. (Proc. Acad. Nat. Sci. Phila., for 1914, p. 585), but the structure of the male hypopygium is different. In *microcellula* the outer arm of the appendage is blunt and sparsely hairy at the apex, the inner flattened blade with a group of small teeth in its angle instead of a single powerful conical tooth. The gonapophyses of *E. microcellula* have numerous appressed teeth along their margins. *E. lucia* Alex., a third member of this group, is a very different fly and needs no comparison with this new species. It is probable that these three species belong to the group of *Erioptera trivialis* Meigen, of Europe, deviating from the general characters of the subgenus *Erioptera* in the often closed cell *1st* M_2, the straight second anal vein and a more or less tumid second antennal segment.

THE *CHLOROPHYLLA* GROUP.

As stated in the introduction to this article, several species were found to be confused under the name of *Erioptera chlorophylla* O. S. It will be necessary to review the specimens in the different museums to get a clear idea of the distribution of the species.

The species known to the writer may be separated in accordance with the following key:

1. Eyes of the male very large, broadly contiguous beneath, narrowly separated by the vertex above; male hypopygium with the two pleural appendages generally similar to one another, slender, tapering to the acute and slightly curved tips; female ovipositor short, strongly curved, the tergal valves blackened and minutely serrate along the ventral margin ....*E. chlorophylloides* n. sp.
   Eyes of the male smaller, widely separated by the vertex; male hypopygium with the two pleural appendages dissimilar in appearance, the dorsal one more or less flattened, the ventral appendage slender with a perpendicular spine at or near the tip; female ovipositor, of the species as known, long, but slightly curved, the tergal valves pale and with the ventral margin smooth....................................2
2. The ventral pleural appendage of the male hypopygium with a very long spine some distance before the tip to form a fork with nearly equal arms or the spine slightly exceeding the actual tip...*E. furcifier* n. sp.
   The ventral pleural appendage of the male hypopygium with the spine smaller, located at the extreme tip or small and situated slightly back from the apex, the forked appearance not so evident.................3
3. Spine of the ventral pleural appendage of the male hypopygium small, shorter than the width of the blade at this point, located some distance before the tip of the appendage and shorter than the enlarged tip beyond it; gonapophyses of either side produced into a blackened divergent horn ....*E. chlorophylla* O. S.
   Spine of the ventral pleural appendage of the male hypopygium longer, located at the tip of the appendage; gonapophyses in the form of flattened paddle-like blades whose outer margins are minutely serrate ....*E. subchlorophylla* n. sp.

Erioptera chlorophylloides new species.

Male.—Length, 4.5 mm.; wing, 5.8–6 mm.

Female.—Length, 5 mm.; wing, 6.8–6.9 mm.

Rostrum and palpi green. Antennæ green, the terminal flagellar segments a little darker. Eyes of the male very large, broadly contiguous on the ventral side of the head, separated by the narrow vertex above.

The thorax and abdomen, including the halteres, wings and their veins light green as in *E. chlorophylla.* Legs yellowish, the segments tipped with green. Male hypopygium with the pleurites more slender than in *chlorophylla,* the two pleural appendages generally similar to one another in size and form but the dorsal one a little shorter than the ventral or inner one. The appendages taper gradually to the acute blackened tips which are curved, the outer or dorsal appendage a little less curved than the other and with an indistinct appressed tooth before the tip. Gonapophyses with a powerful curved blackened hook on either side of the penis-guard.

The female is similar to the male but somewhat larger, the ovipositor small, with the tergal valves comparatively short, strongly upcurved and with the ventral margin minutely serrate; they are dark in color, contrasting with the small green, sharply pointed sternal valves.

Habitat.—Northern North America.

Holotype, ♂, Clear Creek, Colorado, May 25, 1915 (E. J. Oslar).

Allotopotype, ♀, July 1, 1915.

Paratopotypes, 18 ♂ ♀, May 25–July 27, 1915; *paratypes,* 2 ♂ ♀, Parry Sound, Ontario (H. S. Parish).

Erioptera chlorophylla Osten Sacken.

1859, *Erioptera chlorophylla* Osten Sacken, Proc. Acad. Nat. Sci. Phila. for 1859, p. 226.

In the type series as now represented in the Museum of Comparative Zoölogy are three specimens, a male from Bethel, Maine, which is chosen as the lectotype, a female and a broken specimen. I am indebted to Mr. Banks for the above data.

The male hypopygium has the pleurites much stouter than in *chlorophylloides;* the dorsal pleural appendage is a little longer than the ventral, of nearly equal width for the entire length or the apex a very little expanded, obliquely truncated, with the extreme outer angle blackened. The shorter and more slender ventral appendage is suddenly flattened and expanded at the tip, on the caudal or outer margin before the apex with a small, usually slender, blackened spine which is shorter than the width of the blade at this point. The tip beyond this spine is sometimes blackened and, in the type, one of the appendages appears claw-like. Gonapophyses small, each side consisting of a flattened plate whose inner posterior angle is produced strongly laterad into a short blackened horn whose tip is thus strongly divergent from its mate of the opposite side; the penis-guard has a slender arm on either side which form a collar-like structure passing beneath the hooks of the gonapophyses.

Lectotype, Bethel, Maine (Miss Edmands); Blue Hills, Massachusetts, July 16 (C. W. Johnson); Sacandaga Park, New York, June 18, 1914 (C. P. Alexander); near Philadelphia, Pennsylvania (C. W. Johnson).

Erioptera subchlorophylla new species.

Generally similar to *E. chlorophylla.* Male hypopygium with the pleural appendages very dissimilar in shape, the dorsal one expanded into a flattened blade at its apex; ventral appendage shorter and more slender, at the extreme tip with a long, stout blackened spine, directed caudad and placed at right angles to the appendage. Gonapophyses complex, the lateral chitinized arms slender, at the tips expanded into flattened paddle-like blades whose outer margin bears several minute acute teeth; horns of the penis-guard curved, projecting slightly beyond the level of the gonapophyses.

Holotype, ♂, Riverton, New Jersey, June 3, 1910 (C. W. Johnson).

Associated with this male type were several females which have an ovipositor of the type of *E. chlorophylloides* and it is possible that the female of *E. subchlorophylla* is similar to that species. Specimens in copula should be pinned together when captured.

Erioptera furcifer new species.

Generally similar to *E. chlorophylla.* Male hypopygium with the pleural appendages very dissimilar in shape; dorsal appendage slender, broadest and flattened at the base, narrowed to the blunt rounded apex which is heavily chitinized. Ventral pleural appendage slender, on the outer (posterior) margin far before the tip a very long, slender, blacked spine which is almost straight, the proximal face with subappressed hairs, the tip blackened. The slender tip of the appendage beyond this spine is a little shorter than the spine itself, the two appearing as a forked apex to the appendage, diverging at an angle of about 125°. Penis-guard as in the group, at the apex on either side with a long recurved chitinized hook; gonapophyses in caustic potash mounts, pale, flattened, the distal portion only a little wider than the base, the outer margin with minute teeth which extend down to about midlength of the gonapophyse.

Holotype, ♂, Plummer's Island, Maryland, June 24, 1908 (H. S. Barber).

Of the above species, *E. chlorophylla* and *E. chlorophylloides* form one group of species, *E. subchlorophylla* and *E. furcifer* a second group, separated by the form of the gonapophyses.

Mr. Edmund H. Gibson has resigned from the U. S. Bureau of Entomology to enter upon a new field of endeavor. He believes that entomology can be put on a dignified professional business basis just as law, medicine or engineering. He is breaking away from custom believing that after the pioneer work is in hand the field will welcome other entomologists. Mr. Gibson's headquarters, for the time being, will be Alexandria, Virginia.

Gerris argenticollis Parshley originally described from Massachusetts was taken in White Plains, N. Y., April 29, 1917.

J. R. de la Torre-Bueno.

A MORPHOLOGICAL NOTE ON THE TINGOIDEA.

By H. M. Parshley, Smith College, Northampton, Mass.

In the Piesmidæ and Tingidæ the hemielytra exhibit a structural feature which, I believe, has never been employed in characterizing the superfamily Tingoidea, and which seems to have been entirely overlooked except for a brief mention in de la Torre Bueno's description of *Corythaica bellula*.* This structure, which I propose to term the *hypohemielytral lamina,* is a reticulated ridge projecting ventrally from the first longitudinal vein within the costal margin of each hemielytron and extending from the base of the wing to a point at or a little beyond the apex of the abdomen. It follows closely the outline of the abdomen and obviously serves to strengthen very considerably the body of these delicate and fragile insects, preventing any undue overlapping of the hemielytra and contributing an element of rigidity. Our knowledge of the venation of the Heteroptera, as set forth in Comstock's recent book,† is rather meager and affords little assistance in determining the homologies involved, but the suggestion is ventured that the hypohemielytral lamina may have something to do with the *subcostal fold,* a structure of wide occurrence among insects, although the fully developed lamina is not apparently double.

Usually the hypohemielytral lamina is a rather low ridge, of nearly uniform height throughout its length, and containing a single series of clearly defined areoles,—conditions which obtain in the following genera: *Acalypta, Stephanitis, Gargaphia, Leptostyla, Physatocheila, Melanorhopala, Alveotingis, Hesperotingis, Teleonemia, Tingis, Catoplatus, Oncochila.* In *Atheas, Copium, Monanthia,* and *Serenthia* the lamina is extremely narrow and the areoles very small, while in *Piesma* the areoles are scarcely perceptible and the lamina is reduced to a mere beading. In *Corythucha* and *Acysta* there is a single series of small areoles and the lamina is narrow, widened distinctly at base in the former and gradually tapering from base to apex in the latter. In *Galeatus* the basal expansion is very strongly marked, while beyond the third cell of the costal area the lamina is narrowed to the almost total obliteration of the areoles. The lamina in *Hyalochiton* is rather wide, with a single row of large areoles.

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* A New Species of Tingid from New York, Bull. Brooklyn Ent. Soc., 1917, vol. 12, pp. 19–20.

† The Wings of Insects, 1918, Ithaca.

In two of the genera examined the lamina contains more than a single series of areoles, and a new character of taxonomic importance is indicated. *Leptobyrsa* has several irregular rows, three at middle and one at extreme base and apex. In *Corythaica bellula* the lamina is relatively broad, tapering at both ends, and there are two almost regular series of areoles with some indications of a third series toward base, not one as stated in the original description.

The hypohemielytral lamina of *Leptoypha* is of the usual type, with a single series of small areoles, but owing to the slight development of the costal area in certain species the structure may easily be misunderstood. In *L. mutica* the costal area is areolate only toward the apex of the hemielytra, becoming reduced to a mere carina anteriorly. The lamina terminates near the apex of the hemielytra, considerbly beyond the point where the costal area becomes widened and areolate, so that both costal area and hypohemielytral lamina are obviously present apically, and by tracing them forward their relations are made clearly apparent. In his treatment of *Leptoypha** (pp. 58–59) McAtee appears to have misinterpreted these structures. The subcostal area does not in any way form the lateral margin of the hemielytra; on the contrary the cariniform remnant of the costal area forms this margin throughout, without regard to the point of view, and it is the uniseriate hypohemielytral lamina, not the "anteriorly deflexed costal area," which comes into view when the specimen is examined from the side or beneath.

* Key to the Nearctic Species of Leptoypha and Leptostyla, Bull. Brooklyn Ent. Soc., 1917, vol. 12, pp. 55–64.

THE LIMITS OF THE DIPTEROUS GROUP CALYPTRATA (CYCLORRHAPHA).

By J. R. Malloch, Urbana, Ill.

In connection with some work I have been doing on cyclorrhaphous Diptera I have been forced to decide upon characters which will enable students to separate the calyptrate and acalyptrate forms with more certainty, less trouble and experience, and a nearer approach to a natural arrangement than is possible by using any existing textbook. Practically all the writers who attempt to deal with the matter base their separation of the groups upon the comparative size of the calyptra, the calyptrata being said to have large calyptra while the acalyptrata have these organs very small or absent. In the case of the Tachinidæ and the other highly specialized forms the very large calyptra readily distinguish these insects, but many of the genera in Anthomyiidæ and especially in Scatophagidæ have the calyptra very small and such forms cannot be distinguished from acalyptrates by the size of these organs. It is thus impossible to use this character for distinguishing the two groups, and as a matter of fact in practice it either misleads the student or leaves him in doubt as to which group his species belongs to. Some recent writers have tried to make clearer, by elaboration, the distinguishing characteristics of the groups, but as all of them have persisted in placing the Scatophagidæ in the acalyptrates such attempts have been invariably unsuccessful.

It is my opinion that in order to be appropriately applicable to groups of the status of these two in all cases the differentiating medium should consist of one or very few characters which should be, not of a comparative nature, but more or less intimately associated with the biological characteristics of the groups and in a definite manner indicate evolutionary relationships—*i. e.*, the character (structure, usually external) should be one which is either present or absent, or the position of which differs strikingly in the two groups.

In other words the character or characters should clearly indicate natural affinities, be readily appreciable even to students who are not conversant with the species as a whole, and give as little latitude as possible to individual opinion, so reducing probability of error to a minimum.

The standard indicated is a rather high one and undoubtedly very difficult of attainment, but in the case under consideration it is possible by the use of one character to separate nearly all of the calyptrates, including Scatophagidæ, from the other cyclorrhaphous Diptera. This differentiating character is the position of the abdominal spiracles. In the calyptrates these are situated in the tergites, while in the acalyptrates they are situated in the conjunctiva, or membrane between the tergites and the sternites. There are very few exceptions to this rule, those in the former group being present, so far as I know at present, in Gastrophilinæ, and a few males in the Scatophagidæ and Fanniinæ, while in the acalyptrates the exceptions are met with in some genera of Ephydridæ and in a few species of *Dryomyza*. The second antennal joint of all calyptrates has a longitudinal split on its upper outer surface which usually extends to or nearly to the base, a feature rarely present in any of the higher acalyptrates. Accessory characters for the differentiation of the groups are found in the venation of the wings, and the tibial armature. The outstanding fact developed by accepting the tergal spiracles as the differentiating medium is that the Scatophagidæ belong to the calyptrate series, a conclusion which is borne out by their larval characters.

That the position of the abdominal spiracles is of primary importance in classifying mature insects is beyond question, as may be proven by an examination of forms belonging to the various orders, the most generalized forms having them situated in the sternites, while the most specialized have them in the tergites. A striking instance of this specialization is seen in the family Cyrtidæ, the larvæ of which live as internal parasites in spiders, where the species have so far I have seen tergal spiracles, the other Brachycera examined by me having the spiracles in the conjunctiva.

PROCEEDINGS OF THE BROOKLYN ENTOMOLOGICAL SOCIETY.

Meeting of March 13, 1919.—**Scientific programme:** Mr. E. Shoemaker exhibited a series of beetles collected in June, 1918, at Oliverea, Catskills, Ulster Co., N. Y., a list of which is published in the BULLETIN. He also related his experiences with sugaring and showed some of the moths captured. Dr. J. Bequaert spoke on the peculiar position of the wings of a hibernating *Vespa communis* found by Mr. Bell at Flushing, N. Y.; the wings were folded on the sides of the body between the hind legs and the abdomen. Mr. Bueno remarked that he had found *Vespa maculata* hibernating similarly at Palisades, N. J. Mr. Engelhardt read a note by Mr. C. Rummel on *Apantesis virguncula* (in the April BULLETIN). Mr. Doll recalled his experiences in breeding this and other Lepidoptera: *Schizura apicalis* Grote and Robinson, *Lycæna pseudargiolus* Boisduval and Leconte, *Hemileuca burnsi* Watson (Nevada), and *H. neumægeni* Edwards (Prescott, Ariz.).

Meeting of April 10, 1919.—Dr. W. D. Funkhouser was nominated as a member of the Society. A resolution of appreciation and thanks was voted to Mr. P. Dow, to be printed in the BULLETIN, together with Mr. Dow's photograph.

Long Island Records: Mr. Engelhardt mentioned the finding of *Psaphida resumens* Walker ♂ and of *Lycia ursaria* Walker ♂ at Syosset, Nassau Co., L. I., on April 6, 1919.

Scientific programme: Mr. J. R. de la Torre Bueno gave a lecture on "*The historical importance of insects as dominant factors in human progress,*" which will be reproduced in full in the BULLETIN; it was illustrated by numerous lantern slides of insects injurious to human health and of the diseases they convey. Mr. Howard Notman, in speaking on "*Coleoptera collected at Mooers, Clinton Co., N. Y.,*" showed 145 species of beetles collected last summer in that locality; ten of these are described as new, to appear later in this BULLETIN. Mr. C. E. Olsen spoke on "*The European Idiocerus cognatus* Fieber in the vicinity of New York" and also read some remarks on the same subject by Messrs. Dickerson and Weiss.

J. BEQUAERT,
Recording Secretary.

BOOK NOTES.

Wasp Studies Afield. By Phil Rau and Nellie Rau. With an Introduction by William M. Wheeler, Professor of Economic Entomology, Harvard University. (Princeton University Press, Princeton; London, Humphrey Milford; Oxford University Press. 1918.) One volume of 372 pp., with 68 text figures. Price: $2.00.

Before turning to a review of this charming and instructive book, I might, by way of introducing Mr. and Mrs. Rau to the entomological public at large, mention that the authors are of the small number who specialize in the habits of insects, and not, as most of us do, in one of the 34 or 37 orders accepted by modern hexapodists. The series of their valuable contributions to ethology began in 1911 with a study of sexual selection in *Cecropia*-moths. During the next few years eighteen other papers dealing with the habits of insects were published, some of which are real monographs, such as the admirable "Biology of *Stagmomantis carolina*" (1913) and the "Ecological Study on the Sleep of Insects" (1916). However, like so many of their predecessors in this field, they seem to have gradually felt "the lure of the wasp." Nor should we be anything but grateful for it, since their interest in this aspect of insect-behavior has resulted in a handsome volume of over 350 pages, which faithfully records their "studies afield" of some 60 odd species of fossorial and folded-winged wasps.

The opening chapter of the present volume, on "Some Bembicine Wasps," contains, among other topics, a detailed and lively account of the nuptial sun-dance of *Bembix nubilipennis* (Cresson). Nuptial dances are executed by the males of many aculeate hymenoptera, especially bees (*Andrena, Xylocopa* and certain species of *Bombus*), and in one of his former papers (1916), Mr. Rau has described those of a sawfly. The performance is probably due to the prior emergence and early death of the males. An entire chapter is devoted to the Psammocharid or Pompilid wasps, the spider-hunters *par excellence.* Then follow accounts of some fly-catching wasps (genus *Crabro* in the broad sense), the enemies of plant lice (Pemphredonini), the bee-killing wasps (*Philanthus*), and certain of the mud-daubers (*Sceliphron* and *Chalybion*). In the chapter dealing with wasps that prey upon beetles, there are a few notes on *Scolia dubia* Say, though the authors have failed to clear up the mystery of the early stages of that species. Wood-boring wasps, treated in chapter VIII, belong to many unrelated groups of Sphecoidea: *Cerceris, Trypoxylon, Silaon.*

The two comprehensive chapters on the hunters of Orthoptera reveal many novel facts, some of which are worthy of mention even in a brief review. The various *Alyson, Tachysphex* and *Notogonidea* content themselves with small grasshoppers or crickets as prey; while the huge *Priononyx* and *Chlorion,* the giants of the family, store away large-sized locusts and hoppers. A female *Priononyx thomæ* (Fabricius), having found a suitable grasshopper, paralyzes it with her sting, conceals it on the ground and then digs her burrow nearby. When the chamber has been prepared, the prey is dragged inside, an egg laid upon it, and the entrance hole carefully filled with soil. Often, while watching these manœuvres, the Raus saw a female *Stizus unicinctus* Say lurking in the vicinity or even entering the burrow where *Priononyx* was at work. When the nest had been closed and the *Priononyx* had gone, the female *Stizus* was observed to open and enter the burrow, where she remained a short time, probably ovipositing; then she would come out and close the nest again. In such instances examination showed the *Priononyx* egg crushed on the body of the grasshopper. Though the egg of *Stizus unicinctus* was not actually observed on the prey, from this and other observations it is almost certain that this species is a cow-bird wasp, playing the part of a burglar; it uses the grasshopper captured by *Priononyx thomæ* and allied Fossores as food for its own young.

Much has been written by Fabre, Ferton, Peckham and others on the habits of the sand-loving *Ammophila.* Yet, the subject is of such intense interest, that we read with renewed satisfaction the forty pages devoted by the Raus to the nesting of *Sphex pictipennis* (Walsh) and *S. procera* (Dahlbom). Several species of this group have been found to use a tool, with which they pound the soil at the entrance to their closed nest. The Raus' detailed description of the behavior of *S. pictipennis* records an almost rational succession of purposeful movements. If observed in a human being such movements would certainly be explained as intelligent acts. Why call them instinctive, merely because they are performed by an insect? Nor should Fabre's statement that insects are mere machines be taken for granted. Ferton, Roubaud and others have presented proof of the plasticity of insect behavior, and the Raus also cite many cases showing that wasps are not such " sticklers for conventionality " as Fabre tried to make us believe.

The extensive notes on some social wasps will be especially welcome in this country, where so little has been done thus far on this subject. Indeed, our present knowledge of the behavior of social folded-winged wasps is to a very large extent based on the splendid work of C. Janet and P. Marchal in France, A. Ducke and R. von Ihering in South America, and E. Roubaud in West Africa. It is probable that this part of the Raus' book will arouse some discussion, for in their experimental study of the homing of *Polistes pallipes* they have touched upon the problem of individual experience in insects. Due to their various experiments the authors discard Fabre's " unknown power " and Bethe's " additional sense of direction " as well; they incline to the view that memory individually acquired sufficiently explains how *Polistes* finds its way back to its nest, a conclusion also arrived at by Lubbock in his experiments with honey-bees.

Perhaps of all Hymenoptera, the Eumenidæ, or solitary folded-winged wasps, show us the greatest variety of nesting-habits within the limits of a genus. In the fifty odd pages of Chapter XIII, the Raus tell us the history of ten species of *Odynerus, Ancistrocerus* and *Monobia;* all provision their cells with caterpillars, the almost invariable prey among solitary Vespidæ. But, while certain forms merely dig their burrows in the soil, often providing the entrance with an elegant, recurved turret, others build mud-partitions in galleries which they find in logs, and still others are regular mud-daubers, fixing their mud-cells on stones or plants.

In the general considerations with which they conclude their book, the authors first call attention to the vast variety of types of psychic phenomena found within the taxonomic limits of Sphecidæ and Vespidæ. They declare their inability to explain the activities of wasps, either by the machine-theory of Bethe, who refuses to credit animals with any psychic qualities whatever, or by the tropism-theory of Loeb. Their interpretation of wasp behavior is admirably summed up in the following quotation from Professor Wheeler's brilliant introductory pages: "Most of the activities can be readily interpreted as chain-reflexes or 'instincts' in the usual biological sense of the term. They are relatively fixed or stereotyped and undoubtedly hereditary and therefore represent the most ancient and most solidified complex of the behavioristic cycle. But there stand out from this complex many activities which are less mechanized and of such a nature as to demonstrate that the wasps possess emotions and associative memory, that they exercise discrimination and choice, that they learn by experience and form habits in the restricted sense of the term and that they can modify their behavior adaptively in response to unusual stimuli on the basis of previous experience and therefore behave, to a limited extent, like intelligent beings."

Entomologists and other nature-lovers cannot but feel grateful to Mr. and Mrs. Rau for their admirable contribution. In making their wasp-studies they did not venture on lengthy and costly voyages to far away countries teeming with real or imaginary dangers. We follow them in their diligent observation of a *Bembix*-colony to a St. Louis baseball-field, where too often, alas, they are driven away by "a noisy American baseball crowd," or we see them digging for the burrows of *Xylocelia* in the side of a gully in a vacant city lot, filled in with pieces of glass, crockery, cinders, etc.! There are many other features of their work which appeal to us and will make it a model and inspiration to others: the style of presentation which is clear and fluent, yet ornamented just enough to be attractive to the general reader; the care which has been taken to have each member of their little wasp family accurately named by an authority; but above all their unequaled skill and patience in following the wearisome trials and struggles, joys and pains of their highly nervous and often elusive favorites. Indeed with right do they quote the poet's saying:

"He also serves who only stands and waits."

J. Bequaert.

Catalogue Systématique et Descriptif des Collections Zoologiques du Baron Edm. de Selys Longchamps.

The publication of this catalogue is again in progress. M. G. Severin, who has the work in charge, writes the editor thus: I send you the prospectus of the Selys publication, which I would very much wish to finish if it be possible to me. But there is so much work still to do with the material that the aid of the wealthy and the generous is needed to carry it on. Manuscripts are not lacking, only the raw materials, the machines, and we need work for our unfortunate workers. Except those that have seen, none can realize what the devastation here has been. One must believe exaggerations, and all those who have seen realize that it is worse than what has been told in the papers."

We add nothing to this sad glimpse of a war-ridden land. Aside from the real value of this work, all who subscribe to it in whole or in part will directly contribute to the rehabilitation of the chiefest and most heroic victim of the war now in its last days. We will be glad to furnish information regarding cost and terms to those wishing to subscribe.

J. R. T. B.

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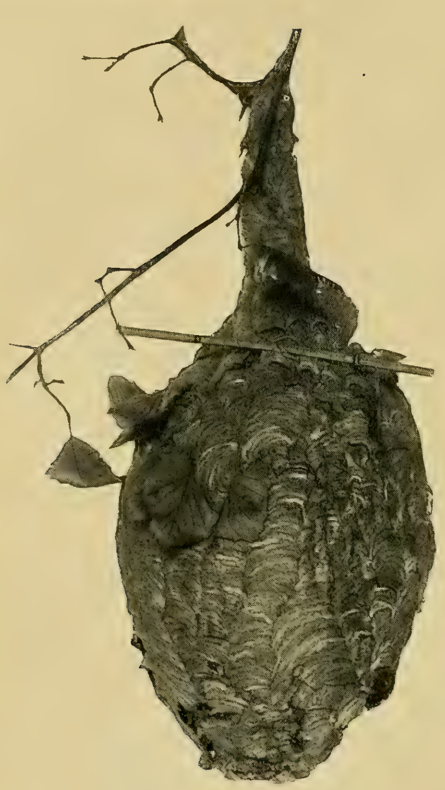

NEST OF VESPA MACULATA

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BULLETIN
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Vol. XIV October–December, 1919 Nos. 4 and 5

A REMARKABLE NEST OF VESPA MACULATA, WITH NOTES ON SOME OTHER WASPS' NESTS.

By Wm. T. Davis, Staten Island, N. Y.

There is a large, shallow fresh-water pond between Cliffwood and Seidler's Beach, New Jersey, and not a great way from Keyport. Here on November 2, 1918, Mr. George E. Ekblaw and Mr. Howard H. Cleaves, while investigating the bird life of the region, discovered a large wasps' nest hanging from the branch of an oak about eight feet above the water. It was two and one-half feet in length, and of such a remarkable shape that they kindly brought it to the writer for further investigation. When shaken several dead *Vespa maculata* fell out of the opening near the lower end of the nest, which was to be expected, as no other species of native wasp would have constructed so large a domicile. In the photograph from which the plate was made a foot rule was included as a guide to size. A few leaves will be seen protruding from the side of the nest, indicating the presence of a branch otherwise wholly hidden, but which joins the branch at the top of the nest. The nest was no doubt commenced on the hidden branch, but as the structure increased in size the paper was extended up the small branch to the one which is seen near the top of the neck. There are indications that more paper was being added at the top of the neck when cold weather put an end to the activities of the colony.

It is a strange fact that these wasps are overtaken by winter with young in the nest that are killed by the cold; they do not prepare with that economy of labor and material with which some other insects meet the advancing season. The nests of *Vespa maculata* are made of old wood macerated by the builder, and are attached not only to the branches and trunks of trees, but to buildings, and sometimes to large boulders and to cliffs. Occasionally they do not allow room for the proper development of the nest, and I have found at least one that had no paper between the lower comb and the ground; it had been started too low down. On June 13, 1915, we found a thick paper sign on one of the trees in Letchworth Park, Portage, N. Y., that was being gradually gnawed to pieces by a *Vespa maculata* to make paper for her own nest. She had torn off the surface of the sign along one edge for about ten inches over a space about an inch and one-half wide. *Vespa diabolica* also makes its nest of old or weathered wood, whereas the large imported *Vespa crabro,* not uncommon on Staten Island, which nests in hollow trees and like places, and our native *Vespa communis* make their nests of new wood. I have two nests of this last, one found under a log lying on the ground on Gardiner's Island, N. Y., July 17, 1918, at which time the queen only was present, but later two workers hatched from the nest. The other *communis* nest was in a cell under a stone at Clayton, Ga., June, 1909, at which time only the queen was found. *Vespa crabro* makes its new wood nest usually from the living bark of lilac bushes and ash trees, and as the wasps often select a certain plant, which they visit again and again, they may become quite destructive.

In *The Guide of Nature* for June, 1917, May, 1918, and September, 1918, there are illustrations of so-called "beaked nests," that is *Vespa* nests with a more or less extended tube at the entrance at the bottom of the structures. This tube offers protection to the small chamber within, and is removed when the nest is enlarged; I have never found them on any but small nests. This also agrees with the observations of Miss Host, whose remarkable nest from Ohio is shown in the September number of the magazine above referred to. While this nest is about two inches in length, the tube is a little over four and one-half inches.

In Smith's Insects of New Jersey, 1909, fig. 277, there is an illustration of one of these small beaked nests of *Vespa maculata* "just started."

While the different kinds of *Vespa* will occasionally eat each other, probably their greatest enemies, in addition to parasites, are to be found among the flies of the family Asilidæ. I have found a *Vespa maculata* being sucked dry by the fly *Proctacanthus philadelphicus* at Deep Pond, Wading River, Long Island, N. Y., August 7, 1912, and *Vespa communis* being so eaten by an Asilid fly at Writesville, N. J., August 22, 1912. On the other hand, I have captured a *Vespa carolina* at Wingina, Va., August 1, 1916, while in the act of devouring an Asilid fly. *Vespa maculata* is a catcher of flies, as is well known, but the wasp does not appear to see its prey at any great distance, and will often go bumping about the sides and top of the tent some time before it catches some of the nearby flies. On August 8, 1912, a *Vespa vidua* was observed at Long Pond, Wading River, Long Island, N. Y., in the act of devouring a damsel dragon fly that had just emerged. Some of our species of *Vespa* will also devour almost any dead animal, and among others I have seen them eating a house sparrow and a water-snake. *Vespa crabro* is very fond of sap from almost any tree, and I have seen them about birch, maple, poplar and oaks, often at the wounds produced by some wood-boring larvæ. All Vespas are fond of the excrement of plant lice, perhaps even more so than of over-ripe fruits.

When the wasps leave their jug-shaped nests at the approach of cold weather, they are sometimes taken possession of by other creatures, and I have found at Watchogue, Staten Island, a *Vespa maculata* nest in which a mouse had its domicile. On December 13, 1908, I saw a tufted titmouse flying about a large nest of *Vespa maculata*, and directly the bird disappeared into the bottom of the nest. It was probably looking for the remains of dead wasps.

It is often said of *Vespa* and *Polistes* that each hibernating queen "starts a colony of its own in the spring." In the *American Naturalist* for 1874 C. V. Riley gives a review of the statements of Siebold concerning the life history and habits of *Polistes*. This author also finds that a single queen *Polistes* starts the new nest in the spring "by the construction of a peduncled gray, paper-like cell, at the bottom of which an egg is deposited."

It is quite true that each queen *Polistes* usually starts a nest, but sometimes two queens work together. In their interesting Wasp Studies Afield (1918), the Raus record that they found in April one new nest of *Polistes annularis* with two queens, and two nests with four queens. In his Revision of the Vespidæ of the Belgian Congo (1918), Dr. Joseph Bequaert states in his ethology of *Polistes* that in tropical counties a new nest may be started by a single queen, but that it has been repeatedly observed that several females may associate in building a new nest for *Polistes gallicus* (Linné), and for *Polistes versicolor* (Fabricius).

The following observations on *Polistes pallipes* may be of interest in this connection:

On Staten Island, N. Y., May 21, 1885, a stone was turned over under which I found a *Polistes* nest of twelve cells. This number makes only a very small nest or group of cells about three-fourths of an inch in diameter. About this small nest I found two wasps, which I thought at the time had constructed it together, as it was too early in the season for one to be the parent of the other. Each completed cell contained an egg.

On May 12, 1906, on Todt Hill, Staten Island, in some old tin cans I found newly started colonies of *Polistes pallipes*. Two, three and four wasps were often attending a single nest of four or five cells, and it was evident that the queens had worked together in founding a colony. At the same place on May 18, 1907, I made the following observations on six nests: Three queens with nest of fourteen cells containing eggs, one in each cell; two with nest of ten cells and eggs; one with nest of three cells and eggs; one with nest of four cells and eggs; one with nest of four cells and eggs; one with nest of seven cells, six of which contained eggs. It will be noted that where there was more than one wasp, that the nests were larger.

At Budd's Lake, N. J., May 23, 1910, I found an old coffee pot in which two *Polistes* had combined in nest building and they had more cells to their structure than some nests built by single females under nearby stones, etc. On May 28, 1916, at

Lahaway Plantation, west of Lakewood, N. J., I found a small *Polistes* nest under a board with two queens attending. They had evidently constructed it together.

While the nests of *Polistes* on Staten Island and vicinity are usually placed in sheltered positions in buildings, old tin cans, cedar trees, box-bushes and like places, yet I have found them occasionally in most exposed situations. The most extraordinary situation noted was a nest built on the flat and exposed surface of a sign board at a cross-roads west of Lakewood, N. J., August 16, 1910. The nest was attached to the face of the board by a slightly curved pedicel and not protected from the weather in any way. In fact the small larvæ might have been wet by a driving rain, as the eighteen cells of which the nest was composed had only a slight downward slope. After photographing this remarkable nest, Dr. Lutz and I put it in a cyanide bottle together with two of the wasps.

NOTES ON SOME SPECIES OF THE CHRYSOMELID GENUS ALTICA (COLEOPTERA).

By J. R. Malloch, Urbana, Ill.

In October, 1918, Dr. W. C. Woods published descriptions of three species of the genus *Altica* from Maine,[1] and in examining the material in our collection to determine whether those new species were to be found here I discovered some facts that appear to be worth recording.

I found specimens of *corni* Wood in our collection from northern Illinois and Wisconsin; *ulmi* Woods from Tyngsboro, Mass., and various parts of Illinois; and *rosæ* Woods from Pennsylvania and New York. I compared the above specimens with examples sent me at my request by Dr. E. M. Patch.

The species described and recorded as *torquata* Leconte by Dr. Woods is undoubtedly not that species. The former is represented in the Bolter collection here by a specimen from Nantucket

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[1] Bull. 273, Me. Agr. Exper. Sta.

Island, Mass., which agrees in all respects with those submitted by Dr. Patch. I have here three specimens which are probably the true *torquata,* which was described from Kansas. These specimens were taken in western Kansas by Dr. Popenoe. The fact that the Maine species feeds upon low blueberry exclusively, a plant which does not extend its range into Kansas, appears to me sufficient evidence that the eastern species is different from *torquata.* I assume therefore that we have in the blueberry species an unnamed form and propose for it the name *sylvia.*

The species I take to be the true *torquata* is much more coarsely punctured and has a much shallower transverse incision on the pronotum than *sylvia.*

There is in our collection a third species of very similar appearance from Arizona which has done duty as *carinata* Melsh., but which is almost unquestionably not that species.

We have a series of specimens labelled *subplicata* Leconte in the Bolter collection. These specimens are much less distinctly shining that *bimarginata* Say, and in my opinion represent a distinct species. The hypopygium of the male I have dissected is similar to that of *bimarginata,* but is entirely smooth both dorsally and ventrally, whereas in *bimarginata* it is transversely furrowed as in *chalybea* Illiger. Probably by rearing the two forms light would be shed on the specific identities.

VIRGINIA HETEROPTERA.

By J. R. de la Torre-Bueno, White Plains, N. Y.

A business trip took me in August of 1918 to the extreme southwest corner of Virginia. Between whiles, I collected. Pulaski is at an elevation of 2,100 feet; and Gossan is a mining settlement about two miles from Monarat P. O., which in turn is 40 miles from Pulaski, and among the Blue Ridge Mountains at 2,800 feet above sea level. Of the 17 species taken, as noted further on, 9 are not recorded from Virginia by Van Duzee in his Catalogue, our most recent authoritative record. The species, arranged according to the same authority for the sake of conformity, all from Gossan, except one so noted, taken on August 30, are:

Cosmopepla bimaculata Thoms.

Not heretofore noted from Virginia.

Trichopepla semivittata Say.

Also new to Virginia.

Sehirus cinctus P. B.

Likewise not recorded.

Corizus lateralis Say.

C. bohemanie Sign.

A new record.

Ligyrocoris diffusus Uhl.

Another new record.

Stephanitis rhododendri Horv.

Gargaphia solani Heid.

This was common at Gossan mines and at the railroad station. In many instances the leaf of the food plant, called "wild tomato" locally, were quite bleached from the numbers in various stages of growth to be found on it.

Microvelia americana Uhl.

Stenodema vicinum Prov.

Not heretofore reported.

Phytocoris tibialis Reut.

Poeciloscytus basalis Reut.

Another most common form not noted from Virginia by Van Duzee.

Lygus pratensis Linné.

Camptobrochys nebulosus Uhl.

Pulaski, August 29, on the under side of maple leaves, in several stages. A new record for Virginia.

Halticus citri Ashm.

Orthotylus flavosparsus Uhl.

Ilnacora stålii Reut.

Not reported from Virginia.

It is curious to note that six of the nine species seemingly new to the state are of the commonest in any field.

THE GENUS BOLTERIA UHLER (HEMIPTERA–MIRIDÆ).[1]

By Harry H. Knight, University of Minnesota, St. Paul, Minn.

The extensive Lugger collection of insects which now forms the basis of that of the Division of Entomology and Economic Zoölogy of the University of Minnesota, contains many important specimens which have been largely overlooked by specialists. A good example of this which has come to the attention of the writer seems to be of sufficient importance to merit special note.

When the writer first glanced over the Hemiptera collection his attention was immediately arrested by the label bearing the name *Bolteria amicta* Uhler. There are six specimens bearing the locality label "N. Mex." and the handwriting of the name label indicates an origin dating back to near the time of the original description of the species. On closer inspection of the specimens the writer was greatly surprised to find them identical with the recently described *Dichrooscytus speciosus* var. *nigropallidus* Knight. By consulting some correspondence saved from Dr. Lugger's files covering the years 1889 to 1892, it was found that Mr. A. Bolter was a personal friend of Lugger and that exchanges of insects frequently took place. It was easy to establish that the handwriting on the name label was that of Mr. Bolter, first by comparison with specific names written in his correspondence, then by labels on other specimens which he had sent to Dr. Lugger.

The genus *Bolteria* was established on the single species *amicta* by Uhler in his paper of 1887 (Ent. Amer., III, p. 33). At the close of the description the author stated: "Mr. Bolter collected several specimens in New Mexico and kindly gave me a pair of both sexes." When the writer studied the Uhler collection early in 1915, no specimens bearing the label *Bolteria amicta* were to be found. Van Duzee states, 1916 (Psyche, XXIII, p. 141) in his note on the genera *Hyoidea* and *Bolteria*, that: "Dr. Reuter did not know *Bolteria amicta*, the type of the genus, but placed

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picta in *Hyoidea* and described a new species *grisea*. An examination of fresh material of *picta* shows that it wants the free converging arolia found in *Hyoidea* and must be placed in subfamily Phylinæ. It is probably safe to assume that *amicta* is congeneric with *picta* although the type is lost and so far as I know the species is now unrecognized."

A comparison of the Bolter specimens with the original description of *Bolteria amicta* shows that they agree in every detail, and the specimens in the Lugger collection received from Mr. Bolter are undoubtedly of the type material. When the writer described *Dichrooscytus speciosus nigropallidus* he did not consider the genus *Bolteria* since it had been placed in the subfamily Phylinæ, therefore the failure to recognize the form. The form *nigropallidus* was described as a variety of *Dichrooscytus speciosus* Van D. since the writer could point out no distinguishing structural difference, yet the forms differ so greatly in general appearance.

Mr. Van Duzee evidently placed *speciosus* in *Dichrooscytus* since it runs to that genus in his tables, and did not consider it sufficiently different to establish a new genus. The writer does not believe that the genus *Bolteria* Uhler (1877) should be thrown into synonomy with *Dichrooscytus* Fieber (1858) for several other genera in the Miridæ are apparently separated on points of less difference than is the case here. The species *amicta* and *speciosus* may well be separated from *Dichrooscytus* by the broader and nearly vertical head, depressed vertex, reniform eyes approaching pedunculate, and with the width of the head across the eyes nearly as great as the width of the pronotum at base.

The species (*Bolteria*) *picta* Uhler (1893) and *hirta* Van D. (1916) are not congeneric with *Bolteria amicta* Uhler, and lacking free arolia, must belong in the subfamily Phylinæ where Van Duzee placed them. Since there is no genus in the Phylinæ to receive them the writer designates a new genus for their reception: PHYLLOPIDEA new genus. Type of the genus: (*Bolteria*) *picta* Uhler 1893 (Proc. Ent. Soc. Wash., II, p. 373).

Phyllopidea is characterized by the presence of pseudo-arolia and genitalia very similar to the general form found in *Plagiognathus;* the tip of the penis twists to the left, lying closely within the bend of the left genital clasper, extending downward and beyond it to the left side, a condition found in nearly all the Phylinæ and is perhaps a good group character. The genus *Phyllopidea* is distinguished by the broad and thick head, tumid front and vertex, the basal margin of the head not forming an evenly arcuated line as in *Europiella,* but having the curve interrupted by the posterior extension of the vertex at the median line; rostrum reaching to near apex of the intermediate coxæ, the first segment thick, in length scarcely surpassing the base of the head; lower face thick, produced downward, when viewed from the side extending below the eye for a distance equal to the height of an eye, in outline the tylus presenting a curve downward and backward, its base distinguished from the front by an incised suture which lies above a line drawn connecting the base of the antennæ; width of vertex equal to or nearly equals one half the width of the pronotum at base, apex of the pronotum in width as great as or greater than is the length; dorsum and head strongly hirsute; width of the hind femur equal to not more than one fourth its length, while in *Europiella* the width is equal to one third the length.

The writer here takes occasion to designate the type specimens of (*Bolteria*) *picta* from the type material used by Uhler for the original description.

Lectotype: Cat. No. 22561 U. S. N. M., ♀, June 22, 1891, American Fork, Utah (E. A. Schwarz).

Allotype: Same date as the type: (Heidemann Coll.) Cornell University Collection. There is also in the U. S. National Museum Collection: ♂, "Colo. 1690"; ♀, May 28, 1904, Govan, Wash. (J. A. Hyslop). In the Cornell Collection: ♀, "Colo. 1690." Specimens from Colorado are larger and more elongate than are those from farther west.

In the absence of type material of *amicta* in the Uhler collection the writer here designates types of *Bolteria amicta* Uhler from the specimens sent to Dr. Lugger. *Lectotype* ♀, "N. Mex." (A. Bolter); Minnesota University Collection. *Allotype:* With the type. *Paratypes:* 1 ♂, 3 ♀, same date as the types.

COLEOPTERA COLLECTED AT MOOERS, CLINTON CO., N. Y., SEPTEMBER 9-13, 1918, WITH DESCRIPTIONS OF NEW SPECIES.

By Howard Notman.

CICINDELIDÆ.

Cicindela tranquebarica Hrbst. (1).
Cicindela repanda Dej. (2).

CARABIDÆ.

Carabus serratus Say (1).
Notiophilus aeneus Hrbst. (1).
Nebria pallipes Say (1).
Dyschirius nigripes Lec. (1).
Schizogenius lineolatus Say (2).
Bembidium honestum Say (3).
Bembidium chalceum Dej. (1).
Bembidium nigrum Say (22).
Bembidium planum Hald. (60).
Bembidium posticum Hald. (65).
Bembidium versicolor Lec. (15).
Bembidium quadrimaculatum Linn. (1).

Bembidium semicinctum n. sp.

Form somewhat broad, slightly ventricose, rather strongly convex. Color black, shining, not at all alutaceous; three basal joints of the antennæ, legs, and the basal margins and apical half of the side margins of the elytra rufo-testaceous. *Head* three fourths as wide as the thorax, wider than the thorax at apex; eyes large, flattened, only moderately prominent; frontal striæ strong, parallel, becoming rather strongly convergent on the clypeus, a short outer groove either side; antennæ moderately slender, reaching the basal fourth of the elytra, outer joints twice as long as wide. *Thorax* one half wider than long, widest at apical third, two thirds as wide as the elytra; base very slightly narrower than the apex; sides strongly rounded in front, strongly oblique behind and sinuate before the slightly obtuse posterior angles; side margins very narrow, reflexed at the edge; basal foveæ large, deep, bistriate, nearly smooth, angles with long, strong carinæ; transverse impressions distinct, median line strong, abbreviated posteriorly, strongly impressed on the disk. *Elytra* slightly less than one third longer than wide, slightly wider behind the middle, thence evenly arcuate to the apex; humeri, completely and broadly rounded; elytra striate, first only entire; striæ rather coarsely and deeply punctate on basal half, more or less obliterated, posteriorly. Third interval with two punctures, one at basal, the other at apical one third. Eighth stria indistinct from the margin and strongly impressed.

Length 3 mm.; width 1 mm. 1 ♀.

This species is closely related to *B. muscicola*, Hayw. It is most easily distinguished by its smooth, not alutaceous head and general coloration. In addition, the thorax is proportionally smaller with the sides more distinctly sinuate and the elytral humeri more strongly rounded. Its peculiar style of elytral maculation distinguish it from the species hitherto described in the *variegatum* (*Notaphus*) *section* of the genus. A species from California (Truckee), *novellum* Csy. (Mem. Col., VIII, p. 113), is similar in form, but the elytra are differently marked and the strial punctures are said to be finer externally. The punctures in *semicinctum* are coarser externally.

Tachys incurvus Say (9).
Patrobus longicornis Say (3).
Pterostichus lucublandus Say (5).
Pterostichus caudicalis Say (1).
Pterostichus corvinus Dej. (18).
Calathus corvinus Lec. (1).
Platynus sinuatus Dej. (1).
Platynus cincticollis Say (1).
Platynus reflexus Lec. (1).
Platynus extensicollis Say (1).
Platynus cupripennis Say (1).
Brachinus cordicollis Dej. (1).
Chlænius sericeus Forst. (7).
Chlænius tricolor Dej. (8).
Chlænius pennsylvanicus Say (2).
Brachylobus lithophilus Say (2).
Harpalus erraticus Say (1).
Harpalus vagans Lec. (4).

HALIPLIDÆ.

Haliplus borealis Lec. (3).

DYTISCIDÆ.

Laccophilus maculosus Germ. (39).
Desmopachria convexa Aubé (1).
Bidessus affinis Say (34).
Cœlambus inaequalis Fabr. (17).
Cœlambus turbidus Lec. (1).
Cœlambus laccophilinus Lec. (2).
Hydroporus vitiosus Lec. (3).
Hydroporus consimilis Lec. (1).
Hydroporus tenebrosus Lec. (1).
Hydroporus modestus Aubé (7).
Hydroporus morio Sharp. (1).
Ilybius biguttulus Germ. (7).
Agabus reticulatus Kby. (1).

GYRINIDÆ.

Gyrinus confinis Lec. (1).
Gyrinus limbatus Say (7).
Gyrinus dichrous Lec. (2).

Gyrinus fraterculus n. sp.

Form oval, slightly elongate, rather convex. Color black, broadly bronzed on the sides, punctures and sutural margin not bronzed; shining, just visibly alutaceous with strong magnification; beneath rufous including the elytral epipleuræ, abdominal segments darker. Thorax not strongly narrowed in front. Apices of the elytra rather broad and broadly rounded, nearly squarely truncate, outer angle distinct, but narrowly rounded; elytral striæ not distinguishable; punctures rather coarse and approximate; outer punctures distinctly coarser.

Length 4.35 mm.; width 2.15 mm. 1 ♂.

This species may be distinguished from *G. limbatus* and *G. dichrous* which it closely resembles by its slightly less strongly narrowed thorax, broader and more squarely truncate and less strongly rounded elytral apices, coarser and more approximate elytral punctures.

Gyrinus maculiventris Lec. (12).

Gyrinus falli n. sp.

Form elongate-oval, evenly narrowed anteriorly and posteriorly, somewhat convex. Color black, suture bronzed, sides rather narrowly and feebly bronzed on the basal third, moderately shining and distinctly alutaceous with magnification; beneath black, legs rufous. Elytral apices rather oblique and strongly rounded, outer angles not distinct; striæ not distinguishable; punctures fine and rather widely spaced, outer ones scarcely larger; punctures of apical oval small, but strong and distinct.

Length 6 mm.; width 3 mm. 1 ♀.

This species resembles *G. maculiventris* very closely in form. It is more gradually and evenly narrowed in front. The elytral punctures are slightly finer and more widely spaced. It is more elongate in form than *G. lugens* and differs from *G. analis* by the entirely black abdomen and strongly rounded elytral apices.

Dineutes discolor Aubé (50).

HYDROPHILIDÆ.

Helophorus lineatus Say (1).
Helophorus inquinatus Mann. (3).
Hydrochus squamifer Lec. (38).
Hydrochus excavatus Lec. (24).

Hydrochus laticollis n. sp.

Form elongate, subcylindrical, very slightly wider behind the middle. Color pale cupreo-iridescent; head brilliant blue-green metallic; beneath dull blackish piceous, antennæ, palpi and legs brownish testaceous, femora and apex of the claw joints darker. *Head* one third broader than long, just perceptibly narrower than the thorax; eyes very large, hemispherical; front oblique on the sides and feebly rounded at the apex which is broad; head coarsely granulate with a narrow longitudinal groove between the eyes connecting with the broadly V-shaped clypeal suture. *Thorax* nearly twice as wide as long, three fifths as wide as the elytra, very slightly wider at apex than at base, widest slightly before the middle, sides slightly more convergent posteriorly than anteriorly, very faintly and broadly sinuate before the obtuse posterior angles; apex truncate, anterior angles slightly obtuse and rounded in but strongly marked, surface coarsely granulate, sides feebly crenulate; disk with two large shallow foveæ on basal half, the usual anterior median fovea greatly reduced in size and distinctness; an elongate fovea on the lateral declivities. *Elytra* three and one half times as long as the thorax, two and one third times as long as wide, much wider than the thorax at base; humeri broadly rounded, sides very slightly wider and just visibly sinuate to apical third, thence feebly arcuate and convergent to the bluntly rounded apex; elytra with ten rows of coarse, deep, subquadrate punctures; intervals unequally subcarinate; the third more strongly elevated at base, fourth elevated for a short distance near the middle, fifth elevated throughout with a break opposite the elevation of the fourth, seventh and ninth elevated throughout with a distinct sinuation opposite the break in the fifth. Tarsi four jointed on all the legs, the last joint as long as the other three combined; claws long, strongly arcuate and denticulate at base; under surface finely granulate and opaque.

Length 3.25 mm.; width 1 mm. One specimen.

This species differs from those hitherto described by its very broad thorax.

Hydraena pennsylvanica Kies. (8).
Tropisternus mixtus Lec. (2).
Tropisternus glaber Hrbst. (34).
Hydrocharis obtusatus Say (5).
Berosus aculeatus Lec. (1).
Berosus striatus Say (63).
Laccobius agilis Rand. (2).
Philhydrus nebulosus Say (1).
Philhydrus ochraceus Mels. (4).
Philhydrus hamiltoni Horn. (2).
Cymbiodyta fimbriata Mels. (3).

Cymbiodyta minima n. sp.

Form oblong-oval, slightly elongate, moderately convex. Color dark piceous, shining, border, including the narrow basal and apical margins of the thorax indefinitely pale. Head slightly transverse, one half as wide as the thorax. Thorax twice as wide as long, as wide as the elytra; strongly narrowed in front, sides feebly arcuate, all angles rounded, apex slightly emarginate. Elytra one half longer than wide; sides nearly straight and parallel to the middle, thence evenly arcuate to the rather blunt apex. Thorax and elytra similarly rather closely punctured, but the elytral puncturation slightly coarser; punctures throughout distinct. Transverse rows of coarser punctures on the thorax rather indistinct; rows of coarser punctures on the elytra not disinguishable; sutural striæ evanescent at basal one third; others absent. Beneath dark piceous; coxæ and tarsi rufo-piceous; finely and closely punctate and pubescent throughout excepting the posterior coxal plates and the narrow posterior edge of the metasternum which is impunctate and glabrous. Prosternum simple; metasternal ridge strongly and acutely elevated at middle, having the appearance of a strong tooth between the middle coxæ when viewed horizontally. Tarsal joints 5–4–4.

Length 2.75–3.5 mm.; width 1.35–1.75 mm. Three specimens.

This species is much smaller and slightly narrower and more parallel in form than *C. lacustris*. In the latter the mesosternal ridge is much less strongly elevated and is broadly arcuate, not at all dentiform.

Helocombus bifidus Lec. (19).
Hydrobius fuscipes Linn. (2).
Creniphilus infuscatus Mots. (5).
Creniphilus subcupreus Say (10).

STAPHYLINIDÆ.

Falagria dissecta Er. (1).
Meronera venustula Er. (1).
Colpodota puritana Csy. (1).
Atheta palustris Kies. (1).
Atheta dichroa Grav. (3).

Metaxya obscuricornis n. sp.

Form rather slender, parallel, depressed. Color black, elytra and antennæ dark brown, scarcely paler, basal joints of the antennæ not at all paler; legs brown, tarsi pale. Head, thorax and elytra feebly shining, uniformly and very finely alutaceous; punctuation scarcely distinguishable; pubescence rather short, fine, pale yellowish, inconspicuous. *Head* slightly transverse, slightly narrower than the thorax; eyes distant more than their own length from the base; tempora parallel; infra-lateral carinæ strong and entire; antennæ moderate in length, somewhat longer than the head and thorax, slender, scarcely incrassate, second and third joints equal in length, about twice as long as wide, and nearly twice the length of the third which is very slightly elongate, five to seven distinctly elongate, eight to ten as long as wide, ten less conical, eleven slightly longer than the two preceding, parallel, bluntly rounded near the apex. *Thorax* one fourth wider than long, widest at apical one fourth, feebly rounded anteriorly, straight and slightly convergent posteriorly to the rounded posterior angles; base broadly arcuate; median line just distinguishable on apical fourth, base with a broad, shallow impression at middle. *Elytra* at base slightly wider than the thorax, one fourth longer on the suture, slightly transverse, sides slightly divergent posteriorly. *Abdomen* narrower at base than the elytra, sides arcuate, widest at middle where it is narrower than the elytra, but wider than the head; fifth segment slightly longer than the others, one, two and three transversely impressed at base; finely alutaceous throughout, a little more shining than the rest of the body, punctures distinct and rather sparse, uniform on all the segments. Posterior tarsal joints short, subequal in length. Middle coxæ contiguous for about one half their length; metasternal projection very short and obtuse, not more than one fifth the length of the cavity.

Length 2 mm.; width .5 mm. 1 ♂.

Male,—posterior edge of the sixth dorsal segment quadridentate; sixth ventral broadly rounded at apex and indistinctly truncate at middle.

This species is distinguished by its small size, slender dark-colored antennæ with long parallel-sided terminal joint, strong infra-lateral carinæ, and rather narrow thorax.

Bolitochara marginella Csy. (5).
Gyrophaena lobata Csy. (3).
Gyrophaena vinula Er. (1).
Myllaena vulpina Brnh. (4).
Acylophorus pronus Er. (1).
Staphylinus cinnamopterus Grav. (1).
Philonthus palliatus Grav. (1).
Philonthus quadricollis Horn. (1).
Philonthus fulvipes Fabr. (2).
Philonthus lomatus Er. (2).

Philonthus opacipennis n. sp.

Form moderately elongate, slightly fusiform. Color black; terminal segment of the abdomen yellowish diaphanous; terminal joint of the antennæ, palpi and legs dark brownish piceous. *Head* oval, one fourth longer than wide, sides almost evenly rounded from the eyes to the neck; eyes small, distant from the base one and one third their diameters; antennæ moderately slender, longer than the head and thorax, second and third joints equal, twice as long as wide; the outer joints decreasing gradually in length, eight, nine and ten as long as wide, eleven one third longer than wide and obliquely truncate at apex; a few punctures on the sides above and behind the eyes. *Thorax* as long as wide; base strongly rounded, sides nearly straight and distinctly converging anteriorly; apex as wide as the head; dorsal series of punctures five, equally spaced in straight rows. *Elytra* as wide as the thorax at base, about one fourth wider at apex, conjointly slightly transverse; suture equal in length to the thorax, apex distinctly emarginate; scutellum slightly more than one third the length of the suture; distinctly alutaceous and subopaque, punctures asperate, fine, rather sparse; pubescence fine and dark, inconspicuous. Punctures of the abdomen asperate, slightly coarser and distinctly denser than those of the elytra. First joint of the posterior tarsi somewhat shorter than the next three, slightly longer than the fifth.

Length 5 mm.; width 1.25 mm. 1 ♀.

Male,—unknown.

Female,—anterior tarsi scarcely dilated; last ventral segment broadly rounded.

This species probably belongs in section C of Horn's synopsis. Its color and antennal structure would indicate a relationship with *P. arizonensis* Horn. The alutaceous and sparsely punctate elytra would distinguish it from that species. Colonel Casey has recently described six species with five punctures in the discal thoracic series (Mem. Col., VI, p. 437), none of which can be identified with the above, either because of elongate antennal joints, elongate and parallel-sided thoraxes, or different elytral sculpture.

Philonthus strigicollis n. sp.

Form moderately slender, slightly fusiform. Color black; first antennal joint entirely, bases of the remaining joints, the elytral suture and legs rufo-piceous. *Head* including the mandibles, one fourth longer than wide, oval, posterior angles rounded to the neck; eyes, moderate in size, much flattened, distant their own diameters from the base; coarsely punctate above and beneath, more closely above; front with a broad median smooth space, constricted between the eyes; antennæ long and slender, all the joints longer than wide, terminal joint truncate at apex. *Thorax* less than one fourth longer than wide, slightly narrower than the head; base as wide as the apex; sides just perceptibly arcuate; apex truncate, base broadly rounded; an irregular row of coarse punctures either side and some irregularly placed punctures on the lateral declivities; head and thorax finely and obliquely strigose either side; when held at a certain angle, the strigæ have the appearance of a dense and fine pubescence, which becomes altogether invisible when the angle is changed. *Elytra* slightly wider than the thorax at base, slightly wider than the head at the apex, about one fourth longer than wide and one fourth longer than the thorax; humeri rounded, sides slightly arcuate; elytra and scutellum moderately coarsely and closely punctate and pubescent. Abdomen finely and rather closely punctate at base, more sparsely and indistinctly at apex, especially at the middle; beneath more coarsely and closely punctate.

Length 6–6.5 mm.; width 1.25–1.45. 2 ♂.

Male,—anterior tarsi rather strongly dilated and spongy pubescent beneath; sixth ventral with a deep triangular emargination, one half the width of the segment and as wide as deep, the edge narrowly membranous.

This species belongs in section E of Dr. Horn's synopsis of the genus; the head punctured beneath would place it with *P. viridanus*. The thorax is said to be very slightly narrower posteriorly with the sides sinuate, and no mention is made of any strigillation of the head and thorax, which is very distinct and peculiar in the above described species.

Actobius cinerascens Grav. (4).
Actobius terminalis Lec. (4).
Xantholinus obscurus Er. (3).

Stenus inornatus Csy. (1).
Stenus colonus Er. (1).

Stenus cænicolus n. sp.

Form rather robust. Pubescence very fine, sparse, griseous surface very highly polished. *Head* large, more than twice as wide as long, a third wider than the thorax; interocular surface twice as wide as the eye; interocular sulcations very feeble, very coarsely and closely punctate; punctures distant by much less than their diameters; median and lateral convexities very feeble, sparsely and irregularly punctate with large, smooth callosities; ocular lines meeting at nearly two lengths in advance; antennæ very distinctly longer than the width of the head; basal joint rufous, the second piceous, the remainder black; funicular joints very long and slender, seventh joint nearly twice as long as wide; palpi dark piceous, terminal joint black. *Thorax* widest at the middle where it is as wide as long; base and apex about equally wide; sides feebly arcuate anteriorly, rather strongly sinuate posteriorly, base truncate, apex slightly arcuate; very coarsely and irregularly punctate, punctures distinctly larger than those of the head and just as dense; median fusiform smooth space and an irregular smooth space either side. *Elytra* at base very slightly narrower than the head, very slightly wider at apex; sides rather strongly arcuate, widest at middle; outer apical angles not prominent; apex feebly emarginate; as wide as long; suture one fourth longer than the thorax; punctures very coarse and deep, more widely spaced on the disk than those on the thorax, as close as the latter on the sides; much sparser along the suture, where the disk is strongly elevated. *Abdomen* at base slightly narrower than the contiguous elytra, arcuate and feebly convergent posteriorly; first segment only with a side margin, two, three and four strongly constricted at base, much more finely, sparsely and irregularly punctate than the elytra; transverse carinæ obsoletely tricusped. *Legs* moderately long, very dark fuscous to nearly black in color; tarsi elongate, first joint of the posterior tarsi longer than the fifth, as long as the second and third together, fourth joint deeply bilobed.

Length 3 mm.; width .75 mm. 1 ♂.

Male,—fifth ventral segment very broadly and feebly emarginate at apex, more densely pubescent on the middle, sixth segment with a small and acutely triangular emargination.

This species belongs in the subgenus *Hypostenus* Rey (Ann. Soc. Linn. Lyon., XXX, p. 183, = *Areus* Csy., partim). In Colonel Casey's synopsis of *Areus* it would be placed among the small species with black legs in the division with unmargined abdomen, and would require a separate section having the thoracic punctures very large, deep and close-set.

Cryptobium bicolor Grav. (2).
Paederus littorarius Grav. (6).
Sunius brevipennis Aust. (1).
Sunius disconotatus Say (4).
Tachinus limbatus Mels. (7).
Apocellus sphæricollis Say (1).

PHALACRIDÆ.

Stilbus obtusus Lec. (2).

CORYLOPHIDÆ.

Bathona sphæricula Csy. (1).
Gronevus sticticus Csy. (1).

COCCINELLIDÆ.

Coccinella transversogutta Fald. (2).
Psyllobora 20-maculata Say (2).

CRYPTOPHAGIDÆ.

Atomaria oblongula Csy. (1).

This species was described from Colorado (Journ. N. Y. Ent. Soc., VIII, 1900, p. 124). The above specimen fits the description exactly.

HISTERIDÆ.

Hister americanus Payk. (2).

LATHRIDIIDÆ.

Melanophthalma picta Lec. (2).
Melanophthalma villosa Zimm. (2).
Melanophthalma distinguenda Com. (1).

BYRRHIDÆ.

Limnichus punctatus Lec. (1).

PARNIDÆ.

Dryops lithophilus Germ. (32).
Dryops fastigiatus Say (5).
Dryops striatus Lec. (6).

Elmis vittatus Mels. (5).
Elmis bivittatus Lec. (4).
Elmis quadrinotatus Say (5).
Stenelmis linearis Zimm. (1).
Stenelmis crenatus Say (19).
Stenelmis bicarinatus Lec. (4).
Macronychus glabratus Say (2).

LAMPYRIDÆ.

Ellychnia corrusca Linn. (4).

SCARABÆIDÆ.

Cremastochilus canaliculatus Kby. (1).

CHRYSOMELIDÆ.

Diachus auratus Fabr. (2).
Chrysochus auratus Fabr. (1).
Typophorus canellus Fabr. v. *4-guttatus* Lec. (1).
Typophorus canellus Fabr. v. *pumilus* Lec. (2).
Labidomera clivicollis Kby. (8).

Calligrapha apicalis n. sp.

Form oblong-oval, very convex. Color dark metallic green, apical angles of the thorax, antennæ, labrum, a spot on the mandibles, palpi and legs bright ferruginous; elytra yellowish white, marked with metallic green as follows, a double coalescent sutural stripe the inner one reaching the basal margin, the outer one shorter, free and slightly divergent at its basal end; at middle, close to the sutural stripe, an elongate lunule, the posterior end strongly hooked (in the type the hook on the right elytron forms a complete circle enclosing a white spot), a large oval humeral spot slightly inclined outward, to which is attached near its posterior end, a narrow sublinear spot strongly oblique toward the suture; between the latter and the suture, a subcircular spot emarginate anteriorly; on the disk and lateral declivities posteriorly, fourteen smaller spots. The spots are all more or less regularly outlined with strong rather coarse and close-set punctures, the punctures of the pale areas are sparse and less distinct. Head one fourth wider than long, slightly more than one half as wide as the thorax; thorax two and one half times as wide as long, three fourths as wide as the elytra; apex strongly emarginate, base strongly bi-oblique; sides rounded anteriorly, nearly straight and parallel posteriorly. Head and thorax more coarsely and closely punctate toward the sides.

Length 7.5 mm.; width 5.15 mm. One specimen.

This species is distinguished from those hitherto described by the ferruginous marks of the thorax and the double sutural stripe. In three specimens collected in the Adirondack Mts. (Essex Co.) one has the anterior halves of the lunules attached to the sutural stripe, the posterior half represented by a detached spot; in the other two the lunule is narrowly broken at the middle on three of the elytra.

Calligrapha bigsbyana Kby. (1).
Galerucella decora Say (1).
Haltica ignita Ill. (1).
Crepidodera helxines Linn. (1).
Systena frontalis Fabr. (1).

ANTHICIDÆ.

Malporus formicarius Laf. (1).
Anthicus festinans Csy. (1).

This species was described from Colorado and Iowa. (Col. Not., VI, 1895, p. 739.)

CURCULIONIDÆ.

Otiorhynchus ovatus Linn. (1).
Hypera punctata Fabr. (1).
Tychius picirostris Fabr. (1).
Pseudobaris pusilla Lec. (5).

ANTHRIBIDÆ.

Brachytarsus sticticus Boh. (1).

The following species in other orders were also taken.

Hymenoptera.

APIDÆ.

Epeolus vernoniæ Ckll. (1) (identified by J. C. Crawford, U. S. N. M.).

ANDRENIDÆ.

Halictus (*Agapostemon*) *virescens* Fabr. (2) (identified by Dr. F. E. Lutz, A. M. N. H.).

MYRMICIDÆ.

Myrmica scabrinodis Nyl. v. *schencki* (?) Emery (1) (identified by Dr. F. E. Lutz, A. M. N. H.).

Diptera.

TACHINIDÆ.

Blepharipeza adusta Loew. (1). (identified by Dr. F. E. Lutz, A. M. N. H.).

Lepidoptera.

LYCAENIDÆ.

Chrysophanus thoë Boisd. (2).

Hemiptera.

BELOSTOMIDÆ.

Belostoma fluminea Say (5) (identified by C. E. Olsen, A. M. N. H.).

Odonata.

AGRIONIDÆ.

Ischnura verticalis Say (1).

AESCHNIDÆ.

Aeschna verticalis Hagen (1).

KERMES KINGII COCKERELL, PARASITIZED BY A MICRO-LEPIDOPTERON.

By Chris. E. Olsen, W. Nyack, N. Y.

On April 5, 1916, I collected some specimens of the gallmaking scale *Kermes kingii* Cockerell on red oak, for the cabinet. I placed them in little boxes in one of my cabinet drawers. Several weeks later upon opening this drawer I was rather astonished to find a few brightly colored micros and could not account for the presence of these in my cabinet, but paid no further attention to this until the next time I had occasion to open this drawer, when I noticed many more of the same little moth scattered over the bottom of this drawer (this must have been about the first part of May?). Upon closer examination I observed that they had all emerged from my *Kermes kingii* scale. Dr. Wm. T. M. Forbes, in a letter dated May 25, 1917, kindly identified this little moth as

Euclemensia bassettella Clemens and notes that their habit of feeding on the female *Kermes* scale is known, but little recorded.

Out of thirty galls collected, seventeen proved to be parasitized by this moth. I believe that in some cases two hosts can emerge from one scale, it was observed, four of the scale had to exit holes and twenty-one moths were counted. s/ w

This scale was collected in Maurice Woods, Masheth, L. I., a beautiful collecting spot now destroyed.

CORRECTIONS AND ADDITIONS TO AN ARTICLE ON LEPTOYPHA AND LEPTOSTYLA (HETEROPTERA; TINGIDÆ).

By W. L. McAtee.

The paper[1] on *Leptoypha* and *Leptostyla* referred to in the title was hurried in preparation so as to get it off before my departure on a field trip, and did not escape the almost inevitable blemishes to be expected from so poor a policy. Certain of these errors have been called to my attention by Messrs. E. P. Van Duzee and Carl J. Drake to whom I am grateful.

A general correction applicable to the whole paper is that the measurements are about 10 per cent. short, due to using the multiplier .030 instead of .033 in converting micrometer readings into millimeters. Other corrections and additions are placed under the names of the species to which they pertain.

Leptoypha minor McAtee. The description of this species should be emended as follows: transpose semicolon from after word "punctured" in 6th line to after word "thick" in 5th line; and add at end of 2d paragraph the words: "margins of thorax slightly explanate anteriorly." This species is very closely related to *L. brevicornis* Champion[2] and may be identical. Since publishing the paper here revised, I have seen this species from the Huachucha Mts., Ariz., and from Redding and Bakersfield, Calif. At the latter locality the insect was so abundant as to be injurious to balm-of-gilead (*Populus candicans*) and Texas ash (*Fraxinus berlandieri*).

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[1] Key to the Nearctic species of *Leptoypha* and *Leptostyla* (Heteroptera Tingidæ). Bul. Brooklyn Ent. Soc. 12, No. 3, July, 1917, pp. 55–64.

[2] Biol. Centr. Am. Rhynch. Hem. Het., 2, p. 32, December, 1897.

Leptoypha costata Parshley. Specimens from Urbana, Ill., have been examined since the previous publication, and Drake has recorded[3] it from Arkansas and Colorado. This species has been recorded as feeding on witch hazel, but I have been unable to find it on this plant. I have, however, collected it from ash.

Leptoypha elliptica McAtee. The known range of this species has been extended from Texas to Georgia and Florida.[4] Professor Drake informs me that it has been taken on *Ilex* sp. in company with *L. ilicis* Drake.

Leptoypha mutica Say. The known range has been extended to Georgia and Florida. (Drake, op. cit., p. 88.)

Replace the name *L. brevicornis* in next to last line on p. 58 with *L. drakei.* Drake has described[5] from Stone Mt., Ga., a species, *L. ilicis,* distinguished from *mutica* by much shorter antennæ and smaller size.

Leptoypha brevicornis Champion. Professor Carl J. Drake has kindly pointed out that the species described under this name in my paper is not *L. brevicornis* Champion. The latter belongs in the subdivision of the genus with explanate costal area. The misidentification is an inexcusable error, with respect to which I can do no more than acknowledge full responsibility and record my regret. The species described on pp. 59–60 of the paper here revised is therefore left without a name, and I take pleasure in naming it *Leptoypha drakei.* The type specimens are those mentioned on p. 60, collected in the Argus Mountains, Calif., April, 1891, by Albert Koebele, and are in the collection of the National Museum. Devil's River, Texas, is a locality in addition to those previously recorded.

Leptostyla clitoriæ Heidemann. Mr. Van Duzee's Catalogue of the Hemiptera of America North of Mexico[6] having been published since my paper, it is well to state that I still find my disposal of the *Leptostyla* species satisfactory and *pari passu* those of the Catalogue not so. *L. clitoriæ* Heidemann (Osborn and

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[3] Bul. Brooklyn Ent. Soc., 13, No. 4, October, 1918, p. 87.

[4] Drake, loc. cit.

[5] In company with a new species of the same genus.

[6] Univ. Calif. Publ. Tech. Bul. Entomology, Vol. 2, November 30, 1917.

Drake)[7] is the same species Heidemann described and synonymizing it with *L. constricta* Champion[8] without examination of the type of that species is guesswork. As pointed out in my paper the species are similar, but specimens from the United States differ sufficiently from the figure in the Biologia to make it advisable to regard the species as distinct.

The known range of the species covers the territory from Massachusetts to South Carolina, and from Indiana to Arkansas.

Leptostyla oblonga Say. The known range is extended to Arkansas.

Leptostyla heidemanni Osborn and Drake,[9] is not a synonym of *L. clitoriæ* Heidemann, but a very distinct species closely related to *L. oblonga* Say.

NOTES ON CERACIS SALLEI MELLIE* AND BRACHYCIS BREVICOLLIS CSY.* BRED FROM FUNGI.

By Harry B. Weiss, New Brunswick, N. J.

Ceracis sallei Melliè (Ann. Ent. France, VI, 377).

This species was described by Melliè in 1848 from specimens collected at New Orleans, Louisiana. Casey[1] in 1898 added North Carolina and Pennsylvania (Westmoreland County) to the distribution. Blatchley[2] records it as rare in Jackson County, Indiana, and Dury[3] in his synopsis states that it is abundant in Ohio and ranges in the Eastern United States, from Canada to Texas. In Smith's New Jersey List it is recorded from East Jersey (Dietz), Chester and Arlington. Recently it has been found at the following additional localities in New Jersey—Springfield, April 22, Monmouth Junction, March 20, High Bridge, March

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[7] Ohio State Univ. Bul. 20, June, 1916, pp. 239–240.

[8] Biol. Centr. Am. Heter., 2, pp. 20–21, Pl. 2, Fig. 6, December, 1897.

[9] Ohio State Univ. Bul. 20, pp. 238–9, June, 1916.

* Kindly identified by C. W. Leng.

[1] Studies in the Ptinidæ, Cioidæ and Sphindidæ of Amer. Jour. N. Y. Ent. Soc., Vol. VI, June, 1898.

[2] Coleoptera of Indiana, p. 901.

[3] Synopsis of Col. Fam. Cisidæ of Amer. north of Mexico, Jour. Cinn. Soc. Nat. Hist., Vol. XXII, No. 2, 1917.

13, and Morristown, March 27, breeding in such fungi as *Polyporus gilvus, P. dichrous, P. versicolor, P. hirsutus, Fomes applanatus, F. igniarius* and *Lenzites betulina* being most abundant in *Polyporus gilvus, P. versicolor* and *Fomes igniarius* and least abundant in *Fomes applanatus.* All of the fungi mentioned occur on the dead wood of deciduous trees except *Fomes igniarius* which is found on the trunks of living deciduous trees.

Ceracis sallei evidently hibernates in the larval and adult stages as both forms were abundant in fungi during March. Egg laying starts during the last of April if the weather is warm as eggs were noted at this time in channels eaten by the adults in the context of such fungi as *Polyporus versicolor* and *P. hirsutus.* The beetles and larvæ both feed in the context and tubes of the fungus and when numerous soon reduce it to a powdery condition so that it eventually weathers away.

The egg is whitish, translucent and oval being about 0.24 mm. long and 0.14 mm. wide. They are deposited singly at the ends of channels eaten by the females. The full-grown larva is 2.4 mm. long and 0.3 mm. wide, subcylindrical, elongate; sparsely hairy; whitish except for third thoracic and first abdominal segments which are brownish and abdominal segments four to nine which are yellowish white, these colors being due to the contents of the alimentary tract showing through the transparent skin. The ocelli are lateral, a pair and one somewhat above making a row of three. The head is slightly narrower than the prothorax; thoracic and abdominal segments subequal in width; first thoracic segment twice as long as second; remaining thoracic and abdominal segments subequal in length; ninth abdominal segment bearing a dorsal pair of dark, chitinized hooks with large, basal portions. Legs terminated by fine, sharp hooks.

Brachycis brevicollis Casey (Jour. N. Y. Ent. Soc., Vol. VI, p. 86).

Casey described this species in 1898 from specimens found at Ithaca, N. Y. It is not listed by Blatchley from Indiana and Dury[4] records it from North Illinois and Mobile, Alabama, saying that it is abundant in Alabama, but that he has not yet found specimens at Cincinnati. Smith in his New Jersey List states that it is sure to occur in the state, but gives no localities. The species can now be definitely recorded in New Jersey from Springfield, April 22, Monmouth Junction, March 1, and High Bridge, March 13, breeding in such fungi as *Polyporus gilvus, Fomes bakeri* and *Fomes igniarius. Polyporus gilvus* occurs on all kinds of dead wood, *Fomes bakeri* on the trunks of living and dead birch trees and *Fomes igniarius* on the trunks of living deciduous trees.

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[4] Jour. Cinn. Soc. Nat. Hist., Vol. XXII, No. 2, p. 22.

The beetle was very abundant in *F. igniarius* at High Bridge, N. J., and *Polyporus gilvus* at Springfield and Monmouth Junction, N. J., and undoubtedly occurs plentifully in such fungi at other localities. Overwintering appears to take place in the larval and adult stages and pupæ can be found during the spring. The larvæ and adults work in both context and tubes of the fungus and pupation usually takes place in the context. When abundant, the fungus is reduced to a fine powder mixed with elongate pellets of black excrement. Emergence takes place either through the upper or lower surface of the fungus; in the case of *Polyporus gilvus,* the lower seems preferred.

Some of the exit holes in both *gilvus* and *igniarius* are topped with little, truncated hollow, cones. These appear to be built by the beetle backing out of its exit hole and voiding pellets of black, shining excrement from time to time around the edge of the circular opening. The interstices between the pellets become filled with borings and the entire mass eventually hardens and becomes quite brittle. The height of these structures varies, but as a rule approaches the length of the beetle.

Full-grown Larva: Length 2.4 mm.; width 0.5 mm.; subcylindrical, elongate, sparsely hairy, segmentation distinct, whitish except for mandibles and adjacent mouth parts which are dark; ocelli lateral, three in a row; head small; first thoracic segment twice as wide as head; first thoracic segment twice as long as second; remaining thoracic and abdominal segments subequal in length; ninth abdominal segment bearing a pair of dorsal, well-developed, dark, chitinous hooks with large basal portions, hooks curved anteriorly; legs terminated by fine, sharp hooks.

Pupa: Length 1.3 mm.; greatest width 0.7 mm. Suboval, white, rounded anteriorly, narrow posteriorly; mandibles prominent, reddish; eyes black, numerous distinct ommatidia; body sparsely hairy; wingpads reaching almost to end of abdomen; anterior edge of prothorax armed with eight spines each terminated by a comparatively long hair; median dorsal surface of prothorax bears four transverse similar spines; another transverse row close to posterior edge of prothorax; a pair of smaller spines on lateral edge of prothorax; a cylindrical, median, dorsal tubercle just behind prothorax; antenna bearing two minute lateral spines; abdomen terminated by two parallel spines.

PROCEEDINGS OF THE BROOKLYN ENTOMOLOGICAL SOCIETY.

Meeting of May 15, 1919.—**Long Island Records:** Mr. Shoemaker shows *Adalia humeralis,* from Brooklyn, N. Y., supposed to be a variety of *Adalia bipunctata.* Mr. Burns exhibits the rare Syrphid *Callicera johnsoni* Hunter taken by him on flowers of *Prunus* on Staten Island; also *Buprestis decora,* found on May 5 at Tompkinsville, Staten Island, this being the most northern record of that beetle, but undoubtedly the result of accidental importation.

Scientific Programme: Dr. Bequaert reads a review of Mr. and Mrs. Phil and Nellie Rau, "Wasp Studies Afield," which has been published in the June number of this BULLETIN. Mr. Engelhardt reports upon the field trip to Flushing, N. Y., on April 20. He also speaks of his collecting experiences in the Pine Barren region at Massapequa, Long Island, on April 14. A special but futile search was then made for *Merolonche dolli* B. and McD., a noctuid, the only eastern representative of its genus and known only by the type specimens from Long Island in Dr. Barnes' collection, a specimen collected by Mr. Engelhardt several years ago at Massauequa and deposited by him in the U. S. National Museum, and another specimen from the same locality captured and owned by Mr. Wm. T. Davis. Mr. Engelhardt found, however, a fine freshly emerged female of *Feralia major,* resting on the trunk of a pitch pine; a specimen taken by Mr. Shoemaker, also a female, and this one are the only known records for Long Island. Other moths taken at Massapequa included: *Psaphidia resumens,* two males; *Todia rufago,* common when beaten from oak branches with last year's leaves attached; *Phobesia atomasis,* common in open woods; *Epicnaptera americana,* two females found resting on tree trunks; and *Lycia ursaria,* three males found under electric lights. That *Vespa crabro,* the European hornet, is now well established on Long Island was shown once more by three hibernating females in rotting logs. Mr. Schaeffer mentions the following other insects taken by Mr. Engelhardt at Massapequa: *Brachypalpus frontosus* Lœw, *Dicerca asperata* L. & G., *Elater hepaticus* Mel., *Cedius spinosus* Lec., and *Philothermus glabriculus* Lec., *Rhytidolomia senilis* (Say). Mr. Engelhardt further exhibits a section of a willow stick one inch in diameter, and split open to show the larval gallery and puparium of *Saperda hornii* Joutel, with one of the beetles fully developed and about to emerge. The stick with others had been received from Mr. Tom Spaulding of Provo, Utah; while supposed to contain larvæ and pupæ of Ægeriidæ, they are furnishing this rare beetle instead.

Meeting of June 12, 1919.—**Long Island Records:** Mr. Davis reads a letter from Mr. J. T. Nichols, reporting the 17-year cicada singing at Mastic, Long Island, during the first week of June; also that he had found on June 9 the partly eaten bodies of many on the ground.

Scientific Programme: Under the heading "Entomological Observations around Bar-sur-Aube, France," Mr. J. M. Nicolay records his collecting experiences while a member of the American Expeditionary Forces in France and shows many of the beetles taken. Mr. J. R. de la Torre-Bueno reads a paper entitled "Some Heteroptera from Western Virginia" which will be published in this BULLETIN. Mr. Wm. T. Davis speaks of his collecting experiences this spring at Rockaway Beach. Insects were plentiful on the beach on May 27, there being many dragonflies, butterflies, Hemiptera, Hymenoptera and Diptera as well as Coleoptera, and a few grouse locusts. Though the weather continued warm, a second visit to the beach on May 31 disclosed the fact that the flight of insects had to a great extent ceased and comparatively very few were found. Mr. Squire mentions that *Carabus nemoralis* is now common in his garden at White Plains, N. Y.

J. BEQUAERT,
Recording Secretary.

Note of Rectification (Hemiptera).—In "**A Morphological Note on the Tingoidea**" (Bulletin for June, 1919) I forgot to mention Stål's footnote (**Enum. Hem.**, 3, p. 115) where attention is called to the structure which I designate as the hypohemielytral lamina. Dr. E. Bergroth kindly reminds me (*in litt.*) of this overnight. I take this opportunity of stating that the name of Mr. A. W. A. Phair should be added to the list of collectors on page 7 of my paper "**On Some Hemiptera from Western Canada**" (Occas. Papers Mus. Zoöl., Univ. Michigan, No. 71, 1919).

H. M. PARSHLEY.

EDITORIAL.

ON "LEAVE TO PRINT."

We have what no doubt may seem unsophisticated editorial ideas naïvely expressed. If we had the gift of a great ex-President of ours, we might express tried truisms in thunderous and arresting form. But we are just ourself, as God made us and we spoilt it, so we must do the best we can.

Nothing is finer than academic freedom, the freedom to voice opinions in scientific matters without trammels. And so we have endeavored to act in regard to the MSS. presented for this BULLETIN. Everything submitted has been accepted so long as it accorded with our published policy and so long as space held out.

We have endeavored to exercise discrimination in the quality of the matter presented, but always we have felt that every man, even a mere writer on insects, is entitled to his day in court. So we have contented ourselves with here and there dotting an *i* or crossing a *t*. But never is any change of moment even thought of, not even to clearing up evident obscurities. We have felt that each man has said what he wanted to say in his own way.

It is obvious, it seems to us, that a patently erroneous statement is more fruitful than one perfectly correct, and an article incorrect in itself frequently does more to advance science than one perfect in all its parts. For the perfect article leaves the reader satisfied. Even if he knows of some additional fact, he is disinclined to burst into print with it from natural modesty or from reluctance to dim the luster of the author's effort.

But let some miserable sinner slip up but once! His hour is come! Those of opposing thought will elaborately set him right, for if "to err is human," to correct is more human. And even entomologists have human attributes when the cosmic vibrations are out of harmony. Likewise his friends may come forth with the quip merrie.

When the dust dies down, science has advanced, for what remains is impregnable fact.

And as to the assay pieces, if we editors admit only the perfect work of the perfect, many a month we would publish the cover ads. only.

Let us rejoice and be happy when we peruse the debatable paper, for out of discussion cometh the light. J. R. T. B.

OUR DOUBLE NUMBER.

The printers' troubles on the one hand, and consequent delays; and on the other the increase in the number of pages this year, make it desirable that we issue a double number, instead of the usual two for October and December.

Our readers, however, are in no way injured, since this year we have published a number of articles that speak for themselves. We likewise have put out a larger volume than in previous years. Volume XII contained 120 pages; Volume XIII, 124 pages; while Volume XIV gives its readers no less than 153 pages. In other words, your depreciated 1919 dollar has bought you more BULLETIN by 28 per cent. than in 1917 and by 24 per cent. than in 1918.

IMPORTANT ANNOUNCEMENT.

The **Bulletin of the Brooklyn Entomological Society** is at last forced to take the unavoidable step. We must revise our price policy completely.

We have put off the evil day much further than our fellow-journals, but the heavy increase in the cost of printing and other expenses of publication compels us to meet it by a corresponding increase in our subscription rate to $1.50 a year for the United States and Canada and $1.75 elsewhere.

We have also found that the cost of separates is a heavy drain, and we are increasing our charge for those in excess of the allowed number to a base price of 5 cents, the other prices for extra pages being increased each by 1 cent.

While we extremely regret that we must do this, it is our endeavor to make our publication self-supporting to as great a degree as possible. We further feel that in the past year we have increased our size (and expense) and therefore value; and we purpose to continue this policy next year, with your coöperation. Subscribers will therefore have a real and adequate return for their subscriptions. We purpose to make this publication a necessity to every serious entomologist. You cannot do without it.

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Apatelodes angelica	12
Hyparpax aurora	10
Cerura borealis	10
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